TECHNOLOGY DEPT.

The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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No. 1248

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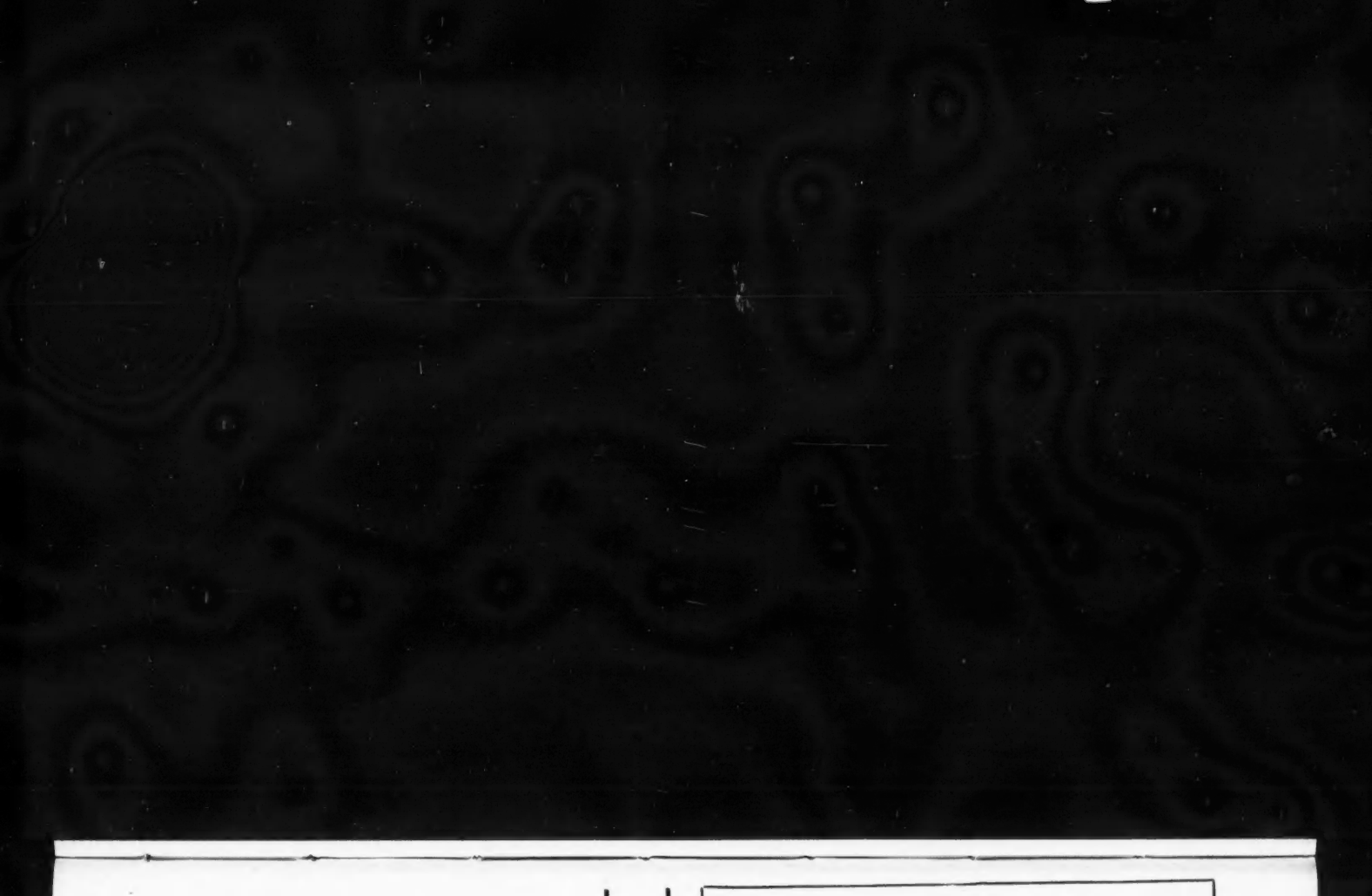

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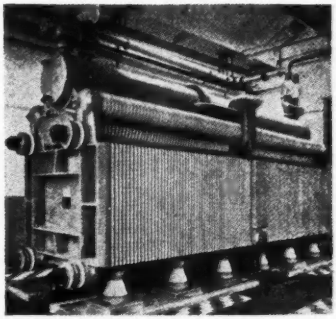

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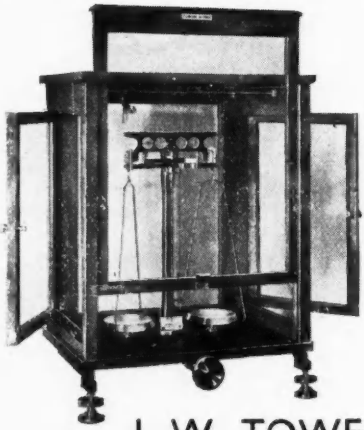

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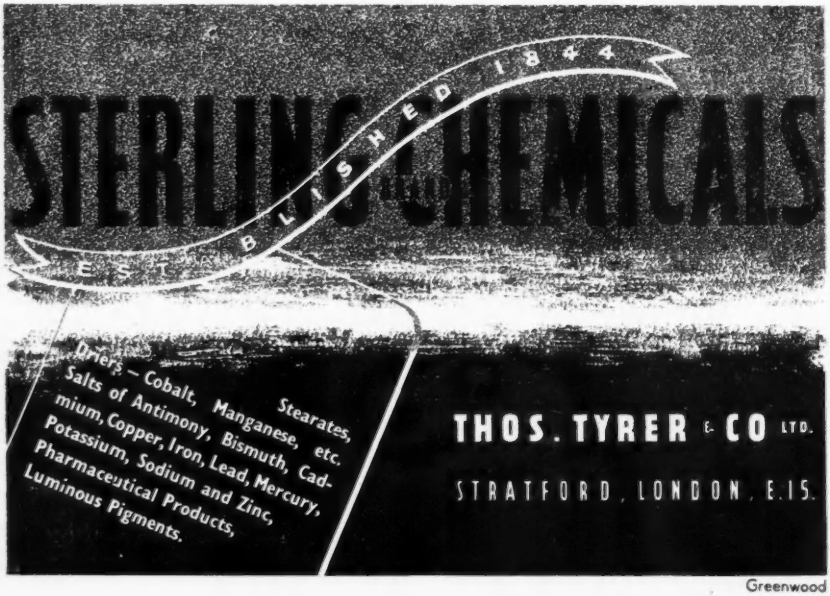

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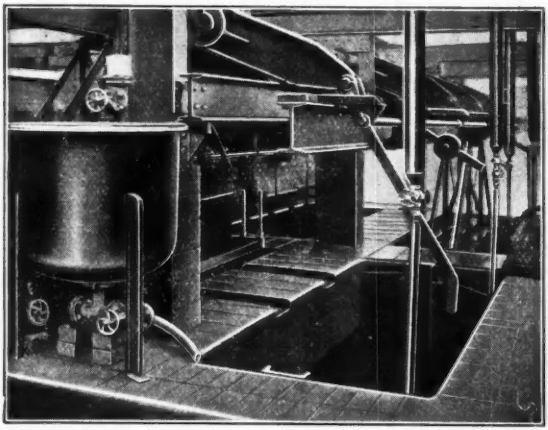

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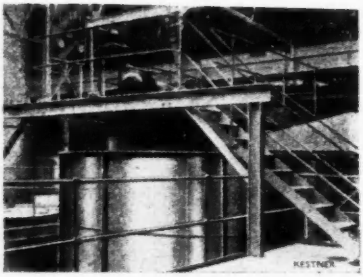

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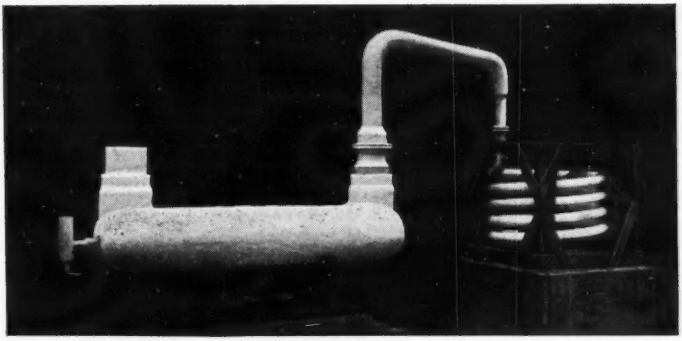

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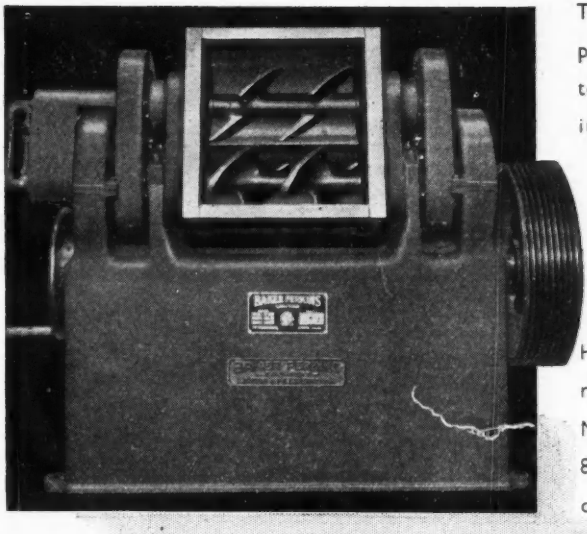

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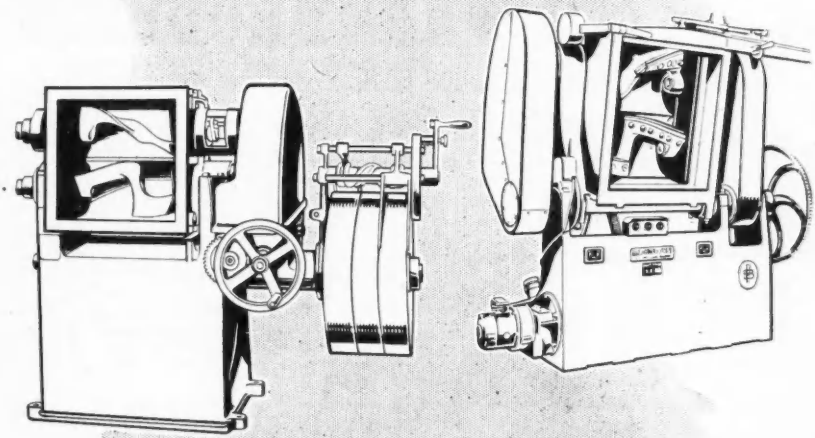

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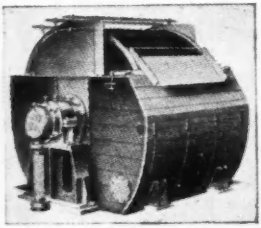

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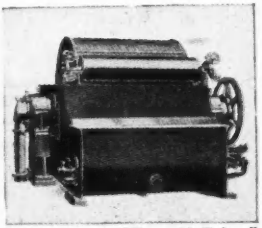

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The Caravan Moves On

"MEN, some to business, some to pleasure take,

But every woman is at heart a rake," sang Pope, and, did he but know it, his gibe at the fair sex of his day cuts deeply into the inmost characteristics of every human being. Those men who take to business, for example, what sort of outlook have they? What are they at heart? Some few rise above their environment, and, in the midst of their daily avocation as chemists, engineers, secretaries, accountants, bankers, and what not, can take the broad view. Of such are statesmen made, chairmen of Trade Associations, and sometimes, but by no means always, heads of great businesses. The great majority of mankind, and this applies to great and small alike, find consciously or unconsciously that their actions and reactions are coloured by their sectional interests. It is difficult for us to welcome an invention that will prove a formidable competitor to our own business. It is difficult for us to approve a course of action that will react detrimentally to our own interests. This is a fundamental fact of considerable importance to the subject that we would here discuss.

The subject is this: Who should control business? The man-in-the-street and the daily newspaper from which he gets his opinions have over-simplified business to two partners: Capital and Labour. By Capital is meant the higher management and the shareholders, and by Labour nearly everyone else. Both of these classes are capable of much subdivision, and it frequently happens that one of the sub-order of a species is the dominating partner. That is the second fundamental fact. The problem as to who should control business can be crystallised in the question: Who is, or should be, the dominating partner? It would be easy, again, to answer this question in accordance with personal predilections; to say, for example (if one were on the staff) that the technical staff should exercise control. To hold that labour should have rather more than an equal share is arguable on some premises, and has been put into practice by at least one great nation. The shareholder would probably say that as his money was invested he should have the say—and in truth he or his agents have by tradition been in control since the industrial era began.

Modern industry, however, cannot be contented with these simple answers; they lead to strife, to the

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N_2O by Neil Nettleton

"The dogs bark, but the caravan moves on."

clash of dominating personalities, and oftentimes to control by those who have not the right characteristics and ability. What sort of control is needed? That question must be answered before it is possible to answer our basic inquiry. Modern industry, as we see it, is a highly complex subject. The control should, may *must*, be exercised by those who have enthusiasm for their work; the control of a business to-day is a whole-time job, and one that needs single-minded application. Enthusiasm is not enough, and experience, which enables many pitfalls to be avoided, is the second essential. A wide knowledge of the technicalities of the industry seems to us to be another essential for the control of *modern* industry. We hasten to explain that this does not mean necessarily that the man in control should be a technical expert; it simply means that he should thoroughly understand what is going on so that he can direct affairs intelligently and foresee possible technical trends either with his own vision, or through the eyes of his technical staff. Finally, the man at the head must have vision, and a blend of caution with the ability to take reasonable risks to improve his business. The control of business, in short, must be in the hands of business men who understand the technical side, or of technical men who understand the business side (according to the nature of the industry), and who will exercise initiative and energy in the prosecution of their affairs. This does not, of course, exclude representation on the Board of any other section—Labour, Finance, Science, and even Politics.

What we object to is domination of industry by those who have no ability to direct affairs in accordance with the pace of modern technical progress. We have seen, in many industries lately, increasing domination by the Banks. Finance, with a capital F, has seen its returns

diminishing. It has seen the opportunity for safe investment restricted, sometimes to vanishing point, and it has cast about for sound industries in which to invest its money, solely with the idea of safeguarding its own sectional interests. There have been occasions in which that control has not been unsound. Financiers who have formed holding companies or have taken similar control over established interests have in themselves been sound business men, and have set up such organisations as will ensure technical progress and sound development. The Banks, however, because their outlook is coloured too severely by the doctrine of the inviolability of Money, are not generally in that category. Security is the only word they understand, and no step is allowed when they are in control that may even faintly prejudice their capital investment. This attitude—so well and often expressed in Government circles as "the dead hand of the Treasury"—leads the Bank Director to say NO to every proposal. "The needle's gotten stuck in the crack," was how a well-known music hall artist described a similar situation. Bank control, therefore, is likely to act as a dead hand upon industrial development at a time when industry wants all the encouragement and initiative it can get. Those engaged in an industry may be morally certain that their process is about to be displaced by a better one; they may propose that certain measures be taken to meet this situation, but the finance must be found. It is only necessary for the Bank Director to realise—as he does automatically—that the new venture has yet to prove itself and is therefore a risk, for him to place his veto upon it. As he controls the money-bags, the scheme cannot be put into effect. Anyone who has been to his bank manager for a loan knows that the disposition is for safety and security every time. That is not the way to build up a great business. There must be a reasonably live spirit of adventure, free to express itself in deeds, if British industry is to prosper. It has been built up on those bases, and without their continuance we do not, frankly, see much future for this country. This war and the events leading up to it have shown that money and bank balances are not the dominating forces they were once thought to be. If the world decided otherwise they could vanish overnight without necessary consequent catastrophe. What is permanent and enduring is the provision of adequate plant, skill to operate it, raw materials, and above all technical progress and the power and will to exploit it.

The Banks, however, do not see matters in that light. When someone protested to the Governor of the Bank of England in regard to the policy of controlling industry by the Banks, his reply is said to have been: "The dogs bark, but the caravan moves on." But, if this is to be the future control of British Industry, then, in the words of Omar:

"The stars are setting and the Caravan
Starts for the Dawn of Nothing."

NOTES AND COMMENTS

A Great Polish Scientist

MONDAY, May 24, was the 400th anniversary of the death of Nicolaus Copernicus, the Polish mathematician and astronomer, whose work marks the beginning of the great constructive era of scientific thought that reached its end and consummation in Newton. A native of Torun, on the Vistula, he was educated at the University of Cracow, and later at those of Padua and Bologna, at that time the leading theatres of progressive thought in Europe. Contrary to what is probably the general opinion, his heliocentric theory, though scoffed at by Luther as incompatible with the Scriptures, did not meet with the disapproval of the Catholic Church, and the Medici Pope, Clement VII, and his successor Paul III (Farnese) both took an intelligent interest in the great scientist's work. It was not until the supremacy of Rome was threatened, through the New Learning, that the Copernican theories were frowned upon at Rome, with the well-known repercussions on Galileo. Copernicus, however, did not undertake the publication of his hypothesis until 1541, and it is said that no printed copy of his work came into his hands until he lay, scarcely conscious, on his deathbed.

It is unlikely, therefore, that he was aware of the apologetic preface inserted by his friend Osiander, explaining (perhaps with an eye on the wrath to come) that the Copernican hypothesis need not be taken too literally. Like many scientific pioneers, Copernicus, though correct in his main principles, was inaccurate as to detail, but his work left an indelible impression on the pages of scientific progress. His fellow-countrymen of to-day do well to celebrate, though in exile, his quatercentenary.

Statistics

ADDRESSING the Institute of Fuel last week, Mr. O. W. Roskill had some interesting remarks to make about the importance of statistics. He described the British as not being "statistical-minded." His explanation of the difference between us and America in this direction was provocative, but probably near the mark. He attributes the American's love of statistics to his "tendency to undisguised pride, which contrasts strongly with secretiveness in this country." The American, he said, will without hesitation show you his works because he is intensely proud of them and may tell you his costs because he believes them to be lower than those of any of his competitors. The Englishman is doubtful whether he is so well placed, and if he is wants to keep the matter to himself for fear lest a competitor copies him or a Government official steps in and tells him his profit margin is too high.

An Overdue Development

MR. ROSKILL considers the British attitude is wrong for three reasons. It is anti-social in that if an industrialist has something better than his competitors the community will reap the greatest benefit if, while rewarding the inventor, it secures the most widespread adoption of the improvement in the shortest possible time. Many will agree with Mr. Roskill's conviction that under modern conditions an anti-social attitude in business does not pay. Secondly, the Englishman forgets the reciprocal advantages he would gain by changing his attitude. Finally, the value of statistics greatly increases with their completeness and degree of detail, for if adequate figures are not available it is impossible to draw the right conclusions from them. In America the vicious circle whereby statistics come to be regarded as capable of proving anything you want them to prove does not exist to the same extent as here, and this is partly due to the fact that detailed figures are more commonly available over there. Perhaps the development of statistical science in this country, due to the war-time necessity of ensuring that our fighting men shall have adequate supplies of equipment, and that the equipment must be matched by a sufficiency of ammunition and other vital accessories, will lead to a change of heart, benefiting industry and the community alike.

China's War Industries

IN this country the ally of which we know least of all is China, yet every item of news from that country shows her to be both resilient and resurgent. Some interesting details of the technological advances made by China are contained in a recent number of *Foreign Commerce Weekly*. The number of chemical works, for instance, has increased from 78 to 380, while the production of fuel alcohol has been trebled since the outbreak of war, so that to-day China's distilleries number well over a hundred. For producing synthetic petrol she now has 22 plants, another 15 for making Diesel oil, while five are engaged in the production of lubricating oil. Industrialisation came into Free China literally on the shoulders of the refugees fleeing before Japan's advance. Knowing that whatever they left behind them would be lost to them, the owners of industrial enterprises dismantled their factories, tore out the machinery and took with them whatever they could carry. Where boats and railways were not available machinery and heavy equipment were carried on the backs of men and beasts over thousands of miles. To-day, in Szechwan Province alone there are over 700 industrial plants. Her greatest iron works have been transferred there from Hankow, Hanyang and Wuchang. In some cases these heavy industries have been protected not merely by evacuation, but by reassembling the plant in tunnels bored in solid rock. China's growing industries are being made impregnable against attack.

Criteria of Dust Determination

Effects of Particle-Deposition Technique

by S. C. BLACKTIN, Ph.D., M.Sc.

SCIENTISTS and technicians are becoming more concerned with dust hazards. The war, and in particular military operations in the desert, have repeatedly emphasised the power of dusts for making or marring the most vital and urgent schemes of men and of nations. Instruments for determining aerosols may be used, however, not only with dusts, but also with smokes and other dispersions or dispersoids, since it is often in such heterogeneous systems that the number of particles in unit volume of the dispersion medium require to be determined.

All the instruments in accepted use can be included in two classes: (1) Instruments removing particles from the original dispersion medium before counting, either (a) by gravitation, or (b) some artificially applied force or forces; (2) instruments counting the particles in their original dispersion medium. The only instruments in this class are the ultramicroscopes, so that considering the efficiency of the instruments in class 1, all except ultramicroscopes will, therefore, have been dealt with.

Although various attempts have been made to compare or contrast the efficiencies of different instruments, no criterion for assessing the efficiency of particle-determination instruments seems to have yet been established. Particle systems have to be determined in many awkward situations. Hence, while the complete efficiency of any of these instruments may be judged in terms of (a) scientific efficiency, and (b) practical efficiency, the latter may be regarded as of almost equal importance to the former for all practical purposes.

The highest scientific efficiency will be reached when the particle numbers are counted (i) over the greatest range of particle number variation, (ii) to the extent of 100 per cent. of those particles actually dispersed, and neither more or less than 100 per cent., and (iii) with the minimum modification of the nature of the particles when using the instrument.

Practical Efficiency

Practical efficiency will be at its maximum when, with similar scientific efficiency, enumeration and examination are achieved with the greatest instrument portability (including minimum weight and volume), economy, freedom from accessories, speed and ease. The importance of these factors is obvious.

Aerosolic dispersions or dispersoids may contain anything between, say, 10 to 10^7 or more particles per ml. of dispersion medium. Mid-ocean air represents the minimum figure; while freshly-formed smokes can reach the maximum figure. In Class 1 instruments, the principle used for the initial operation of taking the particles from their original gaseous medium, whether depositing them as a gel on a supporting surface, or re-dispersing them in a liquid, say water, generally dominates to what specific extent of this universal range any given instrument shall be effective and applicable; and also the area of the receiving support or record, is generally fixed.

Superposition of Particles

The error summed up in superposition is due to one or two kinds of superposition, dependent upon the number of particles per unit volume of the original dispersion. The particle number per ml., at which one form of superposition is substituted by the other, is different for every instrument. As, like the record area, the volume sampled is also generally non-variable, the total particle number = n, to avoid more serious superposition must be equal to or less than x/v where x = record area and v = diametric cross-sectional area of particles, since for all total particle number values greater

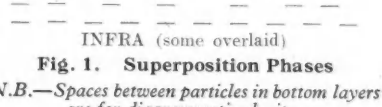

Fig. 1. Superposition Phases

N.B.—Spaces between particles in bottom layers are for diagrammatic clarity.

than x/v, the second form of superposition occurs. Superposition may thus be regarded as compounded of two phases conveniently named *infra* and *ultra* superposition. Infra superposition, which may occur with even small particle numbers, is adventitous, and, favoured by using stationary records, makes the count less than the actual number in the dispersion. Ultra superposition, arising only when $n > x/v$ may obviously become 100 per cent. effective against range efficiency. The point at which infra superposition is substituted by ultra superposition may, therefore, be regarded as the upper range limit for any particular instrument of fixed record. Thus, if $x/v = 10{,}000$, with an instrument of 5 c.c. sampling volume, its range limit is 2000 per c.c., for that particle size, or 0.02 per cent. only of the universal range up to 10^7 particles per c.c. This represents the Konimeter. The severe joint (infra plus ultra) superposition restriction

reduces range efficiency to very much less than 1 per cent. with some other fixed record instruments.

Class 1 comprises (a) four instruments employing different principles of particle transference, but all characterised by the use of fixed records. They are the Konimeters,[1] Jet Dust Counter,[2] Thermal Precipitator,[3] and Settlement Counter[4]: (b) two instruments or systems which, while employing a fixed record area, have a variable link betweeen the obtaining of the sample and its count, so that the record is not fixedly correlated with the dispersion particle number as in the first four cases. This elasticity—though chemically rather than physically and mechanically conceived, hence much more cumbrous and uneconomic—has advantages as well as disadvantages. The two instruments in this group are the Impinger[5] and the Electric (or electrostatic) Precipitator[6]; (c) the Electrotor meter which achieves the elasticity providing valuable advantages and the variable correlation between the dispersion particle number and the record, but does so in the maximum economic manner of physical and mechanical conception by substituting for a fixed record the completely new departure of a variable and rotating record.[7] Of the seven different types, the first four and the last were invented in the British Empire; the other two in the United States.

TABLE 1

Instrument	X.	V.
Electrotor Meter	0.5, 10, 20, 30, 40, or 90 sq. mm.	2 cc. or 8 cc. (others available)
Settlement Counter	100 sq. mm.	5 cc.
Thermal Precipitator	18 sq. mm.	500
Jet Counter	10	50
Konimeters	0.28	5 or 2.5
Electric Precipitator	1	0.001
Impinger	1	0.001

The chief factors used in determining the efficiency of each instrument are the volume

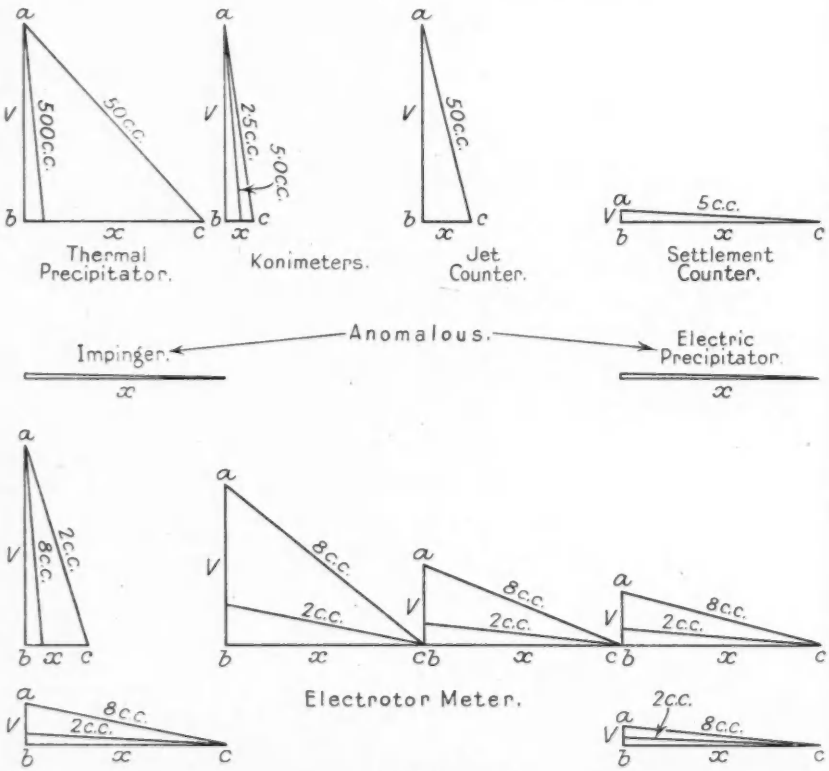

Fig. 2.

of dispersion sampled and the area of reception on the record, and the interrelation between these factors as it affects the particles. In Table 1 are shown the respective values of v and x for the various instruments; v being the volume sampled and x the area of reception surface.

In Fig. 2 the relation between record area x and volume v is portrayed separately for each instrument. Generally speaking, the relative ranges of the various instruments are shown by the respective angles of the line ac. The actual particle number for the upper range limit of any non-universal instrument for any diameter of particle (considered spherical) can be found from the expression: x/vV, where v = cross-sectional area of particles in sq. mm.; x = record in sq. mm.; V = volume of sample in c.c. The resultant figure for any particle diameter with any instrument is the particle number per cc. of dispersion where infra superposition commences for that instrument, with that size of particle throughout the dispersion.

Fixed Record Instruments

It will be noted from Fig. 2 that among the instruments of fixed record, i.e., all except the electrotor meter, the order in decreasing extension of range, and, therefore, of range efficiency, is: settlement counter, thermal precipitator, jet counter, konimeters. The jet counter has a superior range to the konimeter, using 2.5 c.c. samples and a much superior range, using 5.0 c.c. samples. Both the jet counter and the konimeter (2.5 c.c.) have superior ranges to the thermal precipitator using its provided aspirator volume of 500 c.c. Below about 350 c.c., however, the thermal precipitator range becomes increasingly superior to those of the konimeters and jet counter with decreasing volume, so that with a 50 c.c. sample, for instance, it is greatly superior to both. The settlement counter range is vastly superior to those of the konimeters, jet counter, and thermal precipitator. In fact, settlement counter range is, as regards upper limit, universal. It is obvious that selected segments of the universal range are specifically covered for any particle size by a particular non-universal instrument. Any such stretch, however, is but a very small portion of the universal range of, say, 10 to 10^7 particles per c.c., and implies only a very slight advantage in the instrument best covering it. Also, for dispersions of mixed particle sizes, the segments will not necessarily coincide with those indicated.

The best of the instruments for such limited use could only be decided if the particle-size distribution were *pre-known*, i.e., by first using some instrument—perhaps not the best. The positions of the electric precipitator and the impinger are necessarily anomalous. For they are the only two of the seven methods where the characteristics of the record for counting are not automatically correlated with (a) the principle used for removing the particles from the dispersion, and (b) the volume of dispersion dealt with. Neither the impinger technique where maximum particle disturbance, splitting (and in some cases) agglomeration is likely to occur, nor the probably substantial absence of these phenomena with the electric precipitator, are directly reflected in the count. Nor are the effects caused by chemical manipulation of dilution, etc., on the particles after their removal from the dispersion automatically reflected in the count. In both cases an artificially chosen sample is selected for counting, and *so far as this sample itself goes*, superposition is probably absent to a degree not even approached by thermal precipitator, settlement counter, jet counter, or konimeter. But this excellence is limited to the small, artificial sample, and is completely divorced from the realities of particle disturbance, splitting, etc., in the process of the major operation. The expression of these realities, important as they are, is, therefore, denied in the counting of the impinger and electric precipitator. Yet when their effects cause a discrepancy between the actual particle number of the dispersion and the number of its valuation, this cannot be assessed. These detached effects, therefore, make the real efficiencies of the impinger and electric precipitator much more difficult to ascertain even than those of the settlement counter, thermal precipitator, jet counter and konimeter. The practically asymptotic nature of the diagrams (Fig. 2) indicates that these two instruments have, nominally, maximum range efficiency. As the other four instruments render an account of inefficiency due to superposition agglomeration, whereas the impinger and electric precipitator do not, the range efficiencies between the two groups are not comparable in this manner.

Universal Instruments

Of this type of instrument the settlement counter, approaching the universal standard, may be regarded as of much greater known range efficiency than impinger electric precipitator, thermal precipitator, jet counter, or konimeters. The manner in which it fails to reach full universality is that though its large record area/sample volume ratio permits the determination of very dense dispersions before ultra superposition sets in, the record area is fixed. It cannot be reduced to meet the need of lighter dispersions, and hence a point is reached where the particle deposit over the record becomes too sparse for proper counting. Equivalent defects may also arise with the impinger and electric precipitator, which may cut out from their ranges practically all the lightest dispersions.

By providing a variable record area the

Electrotor meter avoids this failure, and since its record may be greatly increased as well as greatly reduced thanks to the incorporation of rotation, without altering volume = V, it alone of the various instruments considered achieves full universality. This is witnessed by the number of diagrams (Fig. 2) which apply to its use. They show it is equal not only to the settlement counter, but, at the end which covers dispersions of relatively few particles, those of the thermal precipitator, jet counter, and konimeters, right down to the lower limit. This single instrument, the Electrotor meter, can therefore, provide counts for any dispersions denied to the last three instruments, and also for selective dispersions denied to the settlement counter. It maximum practical efficiency also makes it truly universal, both as regards range and practical needs. The value of its innovations of rotation, and multiple record areas, does not stop with universal range and complete practical efficiency, but also extends towards the eradication of infra superposition, agglomeration of particles, etc.

Total Agglomeration

Total agglomeration consists of two kinds, viz., (a) that occurring in the intermediate particle-moving process before deposition, and (b) that enforced on the record after deposition, and resulting from superposition. Since the impinger and the electric-precipitator cause by far the largest amount of particle mixing and disturbance—with the electric precipitator a bad second—they are likely to give rise most to type (a) agglomeration. But although introducing error in count, this is not visibly included on a record. The other instruments of fixed record have least of type (a), but most of type (b), with all of type (b) faithfully included on the record. The distinction is that the first two instruments will produce almost perfect records no matter what proportion of inefficiency they represent; while the four fixed record instruments will indicate the inefficiency by the state of the record. Agglomeration (b) has a similar effect to superposition in preventing true particle count and, therefore, affects range efficiency similarly. The chances of such agglomeration occurring with any instrument and any particle size can be calculated, and the inefficiencies of the various instruments due to it can be compared. Just as superposition is avoided by the rotation principle in the Electrotor meter, so is agglomeration (b), and some indication has been given of the distinction between fixed records, which encourage these errors, and the rotating records.[8]

The term "splitting inefficiency" refers to inaccuracy of count through an increase of the particle number in the process of deposition due to the breaking of particles. Like agglomeration it may be of two kindss. There is evidence that serious splitting may occur in the impinger process, though as with the other faults, no physical expression is likely to occur in the count sample. In the other fixed record instruments, splitting may selectively occur due to the particles striking a fixed, stationary, surface though padded with moisture in the Owens jet counter and with adhesive in the konimeters. It should be noted that, as regards true count, splitting tends to cancel the effects of both superposition and agglomeration. But this tendency is not useful since the actual extent of each error cannot be measured. It is clear, however, that splitting will not be so well indicated even on the records of instruments which show clearly the effects of superposition and agglomeration. In the Electrotor meter the rotation is again instrumental in minimising the striking incidence, since the kinetic energy, $\frac{1}{2}mv^2$, obviously cannot produce the same effect on particles deposited on a stationary record as on a rotating one. Also in the electric precipitator and the thermal precipitator the respective electrostatic and thermal tractions are likely to be less violent than the full kinetic action of some instruments.

Ultramicroscopes

There are two instruments in this Class 2, viz.: (1) the rigid, non-portable laboratory ultramicroscope[9] and (2) the Blacktin portable ultramicroscope.[10] Though the latter makes for the first time direct-view determinations of aerosols convenient in almost any location, *e.g.*, in aeroplanes, this is done with full ultramicroscopic efficiency. For instance, liquid as well as solid particles are countable.

Range efficiency is universal in both forms of ultramicroscope, as practically the whole 10 to 10^9 particles per c.c., range is covered. Since superposition is absent the (b) type of agglomeration is also absent. The natural (a) agglomeration is also probably minimised if quick counts are taken, and indeed, its development may be specifically studied by making counts at successive time intervals.

There is minimum likelihood that splitting inefficiency will occur because (a) the particles are not removed from their natural medium, nor forced on to records or into liquids through nozzles or slits, and (b) they are moved relatively gently through a small distance into counting position.

A brief comparison only is made of practical efficiency in regard to all instruments. The Electrotor meter, jet counter, and konimeters all have maximum portability, and while no accessories are required for the Electrotor meter, the konimeter requires adhesive for the record, and the jet counter needs wetted blotting paper. The settlement counter is small and convenient in form, but its great natural portability is marred by

the extreme care which must be taken with it for three or four hours after each sampling. The thermal precipitator is relatively non-portable and requires carefully handled accessories, but not such lengthy care. It may weigh about 20 lb. in all, as contrasted with a similar number of ounces for the previous instruments. It requires electric batteries, a tripod stand, an aspirator, and a water supply, for its operation. With these serious disadvantages, however, the thermal precipitator has practical advantages over the old form of impinger which, however, is now superseded for some purposes by a more portable form, which weighs about 10 lb. The electric precipitator is dependent upon electric mains or batteries and other accessories. As with the impinger, however, the older form has been supplanted by a newer, portable model. This weighs about 25 lb. The older form is essentially a laboratory unit.

Records of Electrotor meter, thermal precipitator, konimeter, jet counter and settlement counter, are ready for counting immediately on removal from the instruments. The Electrotor meter, konimeter, and jet counter produce records for counting a few seconds after introduction into the instrument; the thermal precipitator, about ten minutes afterwards; the settlement counter, three or more hours afterwards; the impinger and the electric precipitator require wet operations and a period relatively lengthy contrasted with the quick instruments.

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Some American Patents

Electroplating Magnesium

HITHERTO it has been impossible to protect magnesium with electrically applied platings of other metals, because it becomes covered with a coating of oxide in an alkaline electroplating bath, and simply dissolves in an acid one. W. S. Loose, of Midland, Mich., has devised a bath containing acids and chromate, which etches the surface slightly and covers it with a protective chromium coating. Electroplating with any desired metal can then proceed in the usual way (U.S.P. No. 2,313,756).

New Papaya Compound

Two chemists of the Department of Agriculture have a new digestive compound (U.S.P. No. 2,313,875), which they call chymopapain, extracted from the tropical fruit papaya. They claim it has several advantages over papain, including better clotting properties when applied to milk, and they state that it is more resistant to stomach acids when used to encourage protein digestion in the small intestine.

Adding Minerals to Food

A patented method of adding minerals to food (U.S.P. No. 2,319,383), particularly iron, copper and manganese, which are all indispensable to human and animal life, has been devised by J. Andrews, L. Evans and L. Huber. The inventors explain that the addition of these minerals in the form of phytic acid salts gives a material advantage over the use of more ordinary compounds such as sulphate and chlorides, as the phytic acid compounds have less tendency to react with other food ingredients and so lose their value.

German Chemical Control

Reorganisation to Save Labour

THE Reich Commissioner for the Chemical Industry has appointed the sectional groups for pharmaceutical products, the sub-division for shoe and leather preservatives, the Sulphuric Acid Comptoir, and the Sulphur Company to act as controlling authorities for the fields of chemical production in which they are interested. The selection of these organisations for the purpose of control would seem surprising were it not known that it has been the general policy of the Reich Commissioner in recent months to transfer the larger part of the administrative and executive work of control to those cartels and combines which are actively engaged in these industries. In these cases it has not generally been necessary to appoint formally the cartels as control authorities, but now the delegation of control powers to private organisations seems to have gone to considerable lengths. Its purpose is to release labour for more important war work.

Reich Commissioner for the Ukraine

The German Reich Commissioner for the Ukraine has set up an association for the chemical industry to which, on the instructions of the Reich Commissioner, all firms and factories with chemical interests must belong, including even those which handle chemical products only on a craftsman's scale. This decision follows similar measures in other industries, and in other German-occupied countries, which have the object of ensuring that the best possible use is made of existing production facilities in accordance with the policy of the German authorities.

British Chemical & Dyestuffs Traders

Association's Annual Meeting

THE 20th annual meeting of the British Chemical and Dyestuffs Traders' Association, Ltd., was held at the Great Eastern Hotel, London, E.C.2, on May 25, Mr. A. F. Lawson (chairman) presiding. In the course of his report, Mr. Lawson said that it was pleasing to observe that several firms had been admitted to membership during the year and that to-day their representative strength exceeded the hundred mark. Regular bulletins had been issued drawing attention to matters of special interest to the trade, and members had been assisted in overcoming many problems arising out of the numerous Orders with which trade and industry have to contend.

Distribution Questions

During 1942 a number of additional chemicals were brought under control and questions relating to distribution were raised. The retention of the established channels of trade for the distribution of controlled materials had constantly been advocated by the Association and a Memorandum on this subject was submitted to the Minister of Supply. Subsequently, a deputation was received by the Minister who indicated that he was substantially in agreement with the principles outlined in the Memorandum and that it was the policy of the Ministry to consult representative associations whenever distribution schemes were contemplated, and to utilise their services when practicable. To assist the various Government Departments the Association had established groups representing the main sections into which the chemical distributive trade can be divided, and these groups were now regarded as an essential part of the machinery for trade consultation.

A number of questions were considered by the group representing the suppliers of raw materials used in the paint industry and this group co-operated with the paint manufacturers in their successful efforts to oppose the original concentration scheme. The Council had accepted an invitation to appoint a representative of the group to the committee of the newly-formed Paint Manufacturers and Allied Trades Association. The Wood Distillates Group had met to consider questions relating to distribution in the home market, while the Coal-Tar Products Group had been particularly active, a number of sub-committees having been created to facilitate consultation with the Ministry of Fuel on controlled products. These consultations avoided a number of problems which otherwise would have arisen after an Order had come into operation. At the request of the Coal-Tar Controller joint consultations were now proceeding between the group and the Tar Acid Producers with the object of setting up an organisation to facilitate exports of cresylic acid to the U.S.A. The Association appreciated the consideration shown by officials of the Coal Division and particularly of the Coal-Tar Control whenever the group had occasion to approach them.

Export trade during 1942, though much curtailed by war conditions, was comparatively satisfactory and a fair volume of business in essential materials for approved destinations was handled by the merchant exporters. After the war the merchant would certainly have to fight, and fight hard, to regain and retain his pre-war export connections. British merchants and private enterprise had been responsible for building up a world-wide trade which has been the envy of every other nation. The present tendency to centralise exports to the Colonies and Dominions through one buying agent was causing not a little anxiety, as such arrangements were detrimental to established exporters.

The chairman expressed the hope that the Government would realise in time that a revolutionary policy was bound to have a retarding effect on the development of post-war export trade, inasmuch as the merchants would be powerless to compete with other exporting countries if established connections were to be severed by official action. In common with other sections of industry, their attention was focussed on the urgent questions which would arise afer the war. The period of reconstruction would start under changed world conditions, which would call for a tremendous increase in the production of peace-time goods to meet expanding consumption. Schemes dealing with the fundamental issues had been suggested for consideration; but in whatever form these ideas might be crystallised it remained apparent that the only efficient machinery for distributing goods was through normal trade channels.

Officers Elected

The following officers were elected: President, MR. VICTOR BLAGDEN (re-elected); vice-president, MR. S. J. C. MASON (re-elected); chairman, MR. G. S. BACHE (ex-vice-chairman); vice-chairman, MR. C. W. LOVEGROVE (ex-treasurer); hon. treasurer, MR. W. S. ADPAR JONES; hon. auditor, MR. B. C. HUGHES (re-elected); executive council, MR. A. F. LAWSON (Jensen, Lawson & Co.), past-chairman, and MR. W. MANN (Produce Merchants, Ltd.).

Annual Meeting of the Chemical Engineering Group

Mr. S. J. Tungay's Address

AMONG those present at the annual meeting and luncheon of the Chemical Engineering Group of the Society of Chemical Industry at the Waldorf Hotel, London, on May 19, were Mr. S. J. Tungay (chairman), Mr. M. B. Donald, Dr. A. Parker, Dr. W. Cullen, Mr. F. A. Greene, Mr. J. Arthur Reavell, Dr. Levinstein, Mr. H. Talbot, Mr. T. W. Jones, Dr. S. Miall, Mr. S. Robson, Mr. H. W. Cremer, Mr. C. S. Garland, Dr. L. H. Lampitt, Dr. G. E. Foxwell, Mr. W. Russell, Mr. R. F. Stewart, Dr. R. T. Colgate, Mr. J. A. Oriel, Mr. J. C. Farrant, and Mr. W. Lloyd Willey.

In his address, Mr. S. J. Tungay said the Chemical Engineering Group was born at the end of the great war and he recalled conversations in July, 1918, with the late Professor Hinchley and Mr. Garland, when they discussed the need for an association of chemical engineers. It was then decided that chemical engineering in this country was not adequately fostered and that something should be done about it. A memorable meeting was held at Kaaba Cafe, King Street, Cheapside, and many who were then present continue active members of the Group.

The First Meeting

In 1919, at the first session, held in Salters' Hall, the late Paul Kestner made the observation that if his career had been successful it was because of the kind welcome he received in his early days when he used to come to this country as an inventor; he received more assistance and help in this country than anywhere else. One often heard that the English were reserved and conservative, but so far as he personally was concerned he could prove that was not the fact. With regard to the work of the Group, Mr. Kestner asked what would the chemical industry be without chemical engineering. It could be said that the first page of the history of chemical engineering industry had been written in England. It had its origin in this country, and yet, surprisingly, when English people wrote about chemical engineering matters they very often forgot the names of Englishmen who had helped to found the industry. For instance, the name of Howard, the inventor of the vacuum pan, was most familiar abroad, and yet it was almost totally unknown in England.

This meeting was followed by a second session, at Newcastle, since when a succession of meetings had been held in London and the provinces. Almost every field and aspect of chemical engineering seemed to have been traversed during the 24 years of the Group's activities. While it was not surprising that the Group was inaugurated largely as a result of demands of the Great War on chemical engineering, it would be agreed that the present world was calling upon chemical engineers for increased initiative, and more rapid and more extensive development of scientific methods.

The Group in War Time

Mr. Tungay continued, "It is inevitable that much of the specialised chemical engineering work that has been carried out during, and for the purposes of the present war period cannot yet be published, but we know that science, industry, and inventive genius have not been standing still, but have been progressing hand in hand with mechanical and industrial development; and we shall find that members of the Chemical Engineering Group are playing an active part in this progress. We may hope for post-war activities of the Group to demonstrate the accomplishments of the war period in the sphere of chemical engineering. We can look forward to the further development of new methods and new processes for the good of the post-war chemical industry and the ultimate benefit and well being of humanity. We may yet be able to say with our Allies '*à quelque chose malheur est bon*'—that out of the evil, the turmoil and the confusion of the war some good may come."

Intensified Competition

Post-war conditions would doubtless show greatly intensified competition throughout the chemical and allied industries. The Chemical Engineering Group must go forward; it could not rely on tradition or on political help. The utmost skill and energy of the chemical engineer would be found more necessary than ever before in order to cope with the large number of natural and synthetic products and new processes.

In conclusion, Mr. Tungay urged the chemical engineer in industry to associate himself with the activities of the Group and thus keep abreast with the newer methods and modern plant developments. The chemical manufacturer should for his part offer every encouragement and opportunity for his technical staff to participate to the fullest in the Group meetings so as to profit by modern improvements in chemical engineering practice to the ultimate advantage and benefit of his own industry.

Effective Technique Against Insects

New Properties of Inorganic Dust

THE 1943 Cantor lectures of the Royal Society of Arts, delivered by Professor H. V. A. Briscoe, Professor of Inorganic Chemistry at Imperial College, on May 17 and 24, were devoted to a consideration of "Some New Properties of Inorganic Dusts." The experiments described by Professor Briscoe are interesting from the economic, as well as the theoretical standpoint, as they concern the effectiveness of a number of dusts used for killing insects. The grain weevil (*Calandra granaria*) was the insect on which most of these tests have been carried out by Professor Briscoe and his colleagues, and the fact emerges that dust obtained by grinding furnace clinkers—tests were made using clinker supplied by Mr. Rees, chief chemist of Battersea Power Station—is apparently a cheap and plentiful source of a suitable dust.

Tests with Weevils

Professor Briscoe said that the annual loss through grain weevils in the U.S.A. was estimated at $300,000,000. The use of dust to protect wheat was known in Egypt a thousand years ago, but it was only 20-25 years ago that biologists became interested in the technique. There were two approaches to the problem; first, the study of the reaction of insects to dust, and secondly, the investigation of the dusts themselves, the latter being the chemist's line of approach. At the start of the experiments it was assumed that there must be some property, chemical or physical, which is responsible for killing the weevil. Live weevils were used as a measure of the killing power of different dusts—a method comparable to that used in testing drugs and disinfectants. It has been found that the weevil is capable of detecting differences between dusts which are undetectable by any other method. To protect wheat against weevil infestation it is mixed with one per cent. (or less) of dust. The dust used has to be non-poisonous, and unobjectionable both from the point of eating, and of handling by the employees engaged in the grain trade. When weevils were given wheat mixed with dust, the mortality rate followed a sigmoid curve, *i.e.*, when mortality percentages were plotted against time. A good measure of the toxicity of a particular dust was provided by the time to kill 50 per cent. of the insects under test. Examination of the insects killed by dust showed that no dust particles had entered the insect's respiratory system (the tracheæ) and it was considered that the main effect was that of the dust upon the cuticle (the outside skin) of the insect. Weevils have a very delicate water balance; their bodies contain 50 per cent. water, their food only 14 per cent.; hence any water loss becomes serious because the insects have a large surface/bulk ratio. The mortality rate of insects kept in an atmosphere of low humidity is considerably greater than at high humidity. By using different kinds of dust (*e.g.*, lime, magnesia, talc, silica, and diamond-dust) it was found that the effectiveness of the dusts as insecticides was in much the same order as the hardness of the material from which the dust was prepared. The hardness of the insect's skin is about 3.5, and dusts with a hardness of 6.5 were found to be good insecticides. The particle size of an effective dust was found to be of the order of 4-5μ.

With clinker dust the economic disadvantages of dust treatment are not avoided; the appearance of the grain is adversely affected by the loss of its characteristic brightness, and it is difficult to assess the value of the wheat by mere inspection. The dust causes "deadness" of the wheat, making it less easy to handle in the granary and elsewhere. The first difficulty encountered in the experiments with clinker dust was that the dust prepared by grinding 15 cwt. of clinker in a ball mill was found to be practically useless, whereas the dust prepared in the laboratory by wet grinding the same material with ether had been found effective. Further tests showed that there was a difference between clinker ground wet and clinker ground dry in the ball mill; thus 15 cwt. of clinker ground wet with water gave a reasonably effective dust, whereas that ground dry did not. This result was followed up by investigating the difference between two samples of quartz, both of the same average particle size (4μ); the wet-ground sample was found to be more uniform, the dry-ground sample containing more particles larger than 10μ and more smaller than 1μ. These two dusts showed a big difference in insecticidal property.

Optimum Conditions

The nature of the liquid used when grinding the material made little apparent difference; this point was investigated, using ether, water, liquid paraffin, and other substances. Time of grinding was also studied; 40 hours was found adequate, and indeed if grinding was extended to 20 days there was no substantial increase in the effectiveness of the dust as an insecticide. A dust to be effective should have a substantial proportion of particles less than 10μ in size. Chemically precipitated powders, such as

zinc sulphide, lead sulphide, calcium fluoride, and silica, were found to be approximately equivalent in their effect on the weevil to the dusts obtained by grinding their corresponding minerals. The effectiveness of quartz dust increased by etching it with dilute hydrofluoric acid (3 per cent.); a similar result was found with glass powder. It seems that the killing power increases with the angularity of the dust particles. These results suggest that water may have a considerable effect on the character of particles and so cast some doubt on the validity of analysing dusts by sedimentation methods.

The Lethal Mechanism

Professor Briscoe developed some interesting speculations about the mechanism by which dust kills insects. He said that powder causing high rates of water loss have a correspondingly high insecticidal value. It is postulated that the water loss concerned occurs through the insect's skin. It had been suggested that this was due to a "blotting paper" effect, the water escaping through some sort of capillary action on meeting the dust, but this explanation was unsatisfactory, for it made no difference in these tests whether the powder used was hydrophobic or hydrophilic; the killing power of Neosyl and carborundum were not materially altered when the particles were coated with stearic acid, making them water-repellent. The insect's skin is considered to be in the nature of a semi-permeable membrane impregnated with lipoids; it has been described as being proteic in origin, the protein being tanned with an orthoquinone. To obtain an analogy to the insect's cuticle, artificial membranes were made by using a membrane of celluloid thinly coated with wax (*e.g.*, beeswax, apple wax, etc.). The rate of water loss from the celluloid decreased when it was coated with wax, and if the coated surface was then dusted with a powder, the rate at which water was lost increased, although it did not reach the same rate as that from untreated celluloid. Apparently the effective waxes were chemicals with a polar character; non-polar materials like heavy paraffin oil, oleic acid, and anthracene had no such effect on the water loss from celluloid membranes. The lecturer stressed that these experiments with artificial "skins" provided no more than an *analogy* to what actually occurs with the insect skin; it was probably not a true copy of the phenomenon met with in insects. He suggested that the effective dusts were those in which the particles retained a relatively unspoilt molecular lattice. Such particles are known to have a powerful attraction for polar films, so that lipoids, for instance, might become attached to the dust-particle surface instead of to the cuticular membrane. This theory is an aid to understanding how the structure of the cuticle might become upset by coming into contact with dust particles. Professor Briscoe's lectures will be published in the forthcoming number of the *Journal of the Royal Society of Arts*.

Tungsten Carbide

Australian Manufacturing Process

THE necessity for making Australia's defence industries independent of an overseas supply of tungsten carbide was foreseen before the war, and with the object of overcoming this possible situation the Broken Hill Proprietary Company, Ltd., negotiated with certain overseas firms for the purpose of obtaining information on the complicated technique of producing tungsten carbide. However, this information was never provided, so that in December, 1940, it became necessary for a committee to be formed at the Newcastle Steel Works in order to draw up a research programme, and an account of the resultant manufacture in Australia is given in *Chem. Eng. and Mining Rev.* (1943, 35. 414, p. 153.)

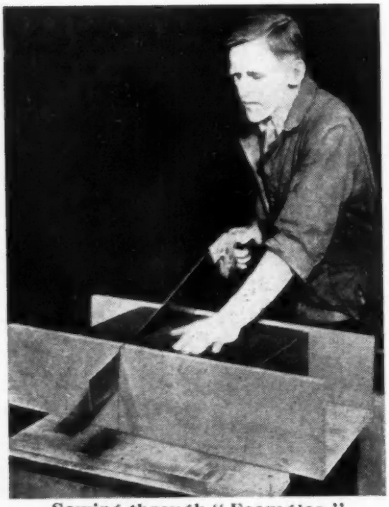
Rapid Progress

After a small team of investigators had carried out the necessary research, erection of a pilot plant started in January, 1941, and was completed six months later. By October, the first successful steel-cutting tips had been produced and by Christmas, 1941—only 12 months after research began—the secrets of the process had been mastered and the B.H.P. 25-pounder high explosive shell annexe was using no cutting tips other than those made by the firm. The process used depends on the continuous reduction of tungsten oxide at 900° C. in electrically-heated reduction furnaces in a stream of hydrogen. A mixture of tungsten powder and lampblack is continuously pushed through a special hydrogen atmosphere furnace operating at 1600° C. The necessary titanium carbide is obtained from a mixture of titanium oxide and lampblack. After sieving, the carbides are ball-milled with cobalt and then pressed to the required shape by means of a 100-ton hydraulic press. The cycle of production is completed when the compacts are treated in the final sintering furnace, which is molybdenum-wound, electrically heated, and with a hydrogen atmosphere. The temperature used varies between 1450° and 1550° C., according to the grade and size of the product. Extreme care and control is essential at all stages of the process; for instance, the job of maintaining constant uniformity of grain size requires chemical analysis, and furnace control and milling control for 24 hours a day.

Glass that Floats

American "Foamglas" for British Production

THE new type of glass, called "Foamglas," that floats like cork and can be used as the buoyant element in the construcion of life boats, life belts, and pontoon



Sawing through "Foamglas."

bridge supports is now in large scale production by the Pittsburgh Corning Corporation in America. It has a weight of only 10 lb. per cubic foot—one-fifteenth that of ordinary glass—and is fireproof and vermin proof. It also has valuable insulating qualities.

"Foamglas" is now under active investigation by certain Federal Government agencies as an alternative for such scarce materials as cork, balsa wood, cellular rubber, and kapok, which are largely imported. With a cellular structure composed of countless tiny air-tight cells, it can be sawed or drilled with ordinary tools. Because of its closed cell structure it will not absorb water and it will float indefinitely. A bullet will pass through but only destroy the cells in its path, so the remainder still floats. It might also serve for buoys.

It is produced by firing ordinary glass which has been mixed with a small quantity of pure carbon, when the glass softens and the carbon turns to gas which then acts upon the molten glass in a manner which resembles the action of carbon dioxide in making bread rise. By proper selection of the glass batch and the type of carbon, and by exact control over time and temperature, it is possible to obtain rigid slabs of "Foamglas," in which the cells are of a uniform small size and entirely sealed one from the other. In America it is being made in slabs 12 in. by 18 in., and 2-6 in. thick.

Manufacture of this kind of glass in Britain is to be undertaken in this country, but production on a commercial scale has not yet started. It will be handled by Pilkington Bros., Ltd., of St. Helens.

Uses of Carbon Dioxide

American Industrial Applications

THE number of industrial uses for carbon dioxide is now enormous. In addition to the purely chemical applications of solid and liquid carbon dioxide, the following will be of interest to the chemist: protecting combat planes from tracer bullets by flooding spaces in and around the fuel tanks with carbon dioxide gas just before going into action; inflating the rubber boats and life preservers used by aviators; producing inert atmospheres to prevent fire, explosion, or damage to products or equipment when oxidisable materials are being heated, pulverised, or otherwise treated; extinguishing fires, especially of inflammable liquids and electrical equipment; safe "blasting" of coal and such materials as caked stores of salt, sulphur, etc., by the use of cartridges filled with liquid carbon dioxide.

Other applications include: preserving in sealed containers such foods as milk powder, coffee, prepared coconut, cashew nuts, and cod-liver oil; preserving, while in refrigerators, such foods as meats, poultry, fish.

The following are special uses for solid carbon dioxide: freezing gummy materials, such as rubber, chicle, and raw hide, in order to permit grinding or other treatment; dehydrating certain gases and organic liquids by freezing out their aqueous content; dewaxing oils in a similar manner; testing metals, oils, etc., at low temperatures; keeping aluminium rivets, used in aeroplane manufacture, at a low temperature before use, which prevents them from becoming hard and brittle; creating a high vacuum in exhausted containers, such as radio and neon tubes, and laboratory apparatus; creating porosity in materials, as in the manufacture of sponge rubber or in "raising" dough; checking the flow of chlorine gas from leaking cylinders containing the liquid; making shrink fits in machine shops, by cooling the inserted part before insertion (*Chem. Ind.*, 1943, *52*, 2, p. 211).

New Insecticides

Latest American Research

NEW insecticides being perfected in America were reviewed in THE CHEMICAL AGE last year (1942, *47*, 1202, p. 31), when an account was given of experiments made with phenothiazine, dinitro compounds, thiuram disulphides, thiocarbamates, etc. News of further developments is contained in *J. Econ. Entomology*, 1942, *35*, 6. M. W. Stone, of the U.S. Department of Agriculture (p. 860), describes the use of dichlorethyl ether for killing wireworm. This chemical was tried against wireworms infesting rows of sugar beet, and it was found that 81-100 per cent. of the insects were killed by a solution of 0.2-1.2 oz. of dichlorethyl ether per 100 gallons of water, applied to the soil at the rate of 4-6 gallons of solution per foot of sugar-beet row. Another valuable insecticide, which happens to have fungicidal properties as well because of its copper content, is basic copper arsenate, which was first developed for this purpose in 1939. Field tests show that it is efficacious against many pests, and can be used without damage to plants such as cotton, potato, beans, soya beans, tomatoes and cranberries. Methyl bromide is gaining favour as an insecticidal fumigant, and when used to kill beetles infesting loaded refrigerator cars on American railways, it achieves mortality rates of 100 per cent. Heber C. Donohoe and G. H. Gaddis, U.S. Department of Agriculure (p. 947), describe its utilisation, and state that for refrigerator cars an effective dose is either 5 lb. per car at 70°F. or 4 lb. at 80°F.

Plant Pest Control

Scheme for Proprietary Products

A SCHEME for the official approval of proprietary products for the control of plant pests and diseases, agreed by the Ministry of Agriculture and Fisheries and the Association of British Insecticide Manufacturers as the representative body of the industry, was inaugurated by the issue by the Ministry of a press notice in October, 1942. The Department of Agriculture for Scotland had agreed to participate in the scheme. The particulars of this scheme have been made available on application.

It has now been decided that the groups of products first to be considered for approval under the scheme shall be the groups (1) lead arsenate powders, (2) lead arsenate pastes, (3) lime sulphur, (4) miscible tar oil winter washes, (5) stock emulsion tar oil winter washes, and (6) the organo-mercury dry seed dressings containing organo-mercury compounds as the sole active principle. Official specifications, which are accepted by the Ministry and the Department and the manufacturers for the purposes of the scheme, are available for the first five groups and are published in the Ministry of Agriculture Bulletins No. 82—groups (1), (2), and (3)—and No. 122—groups (4) and (5). Products in these groups will, therefore, be considered for approval under Section 6 of the scheme. No such specification is available for the sixth group; products in this group, will, therefore, be considered for approval under Section 7 of the scheme.

The Ministry and the Department are now prepared to receive applications in these six groups. Applicants must be either the manufacturer or the authorised agent under whose name the product is sold. For a product sold and used in Great Britain but manufactured elsewhere, application will be accepted from the authorised selling agent resident in Great Britain, who will be required to accept responsibility for breach of any undertaking or condition on the strength of which any approval may be granted. Application forms may now be obtained; a separate form will be required in respect of each proprietary name. Requests for forms, indicating the number of applications to be submitted in each of the above groups, should be sent to the Secretary of the Advisory Committee, Plant Pathology Laboratory, Milton Road, Harpenden, Herts.

ELECTRON DIFFRACTION

The thirty-third annual May Lecture of the Institute of Metals was delivered by Professor G. P. Thomson, D.Sc., F.R.S., at the Institution of Mechanical Engineers on May 19, the subject being "Electron Diffraction."

Professor Thomson began by giving an elementary account of the theory of electron diffraction, pointing out that electrons could be diffracted by crystalline materials much as X-rays were. The effect might thus be used to investigate crystal structures and was especially useful for dealing with thin surface layers. From the very many applications that had been found for the method of electron diffraction, the lecturer then selected a few of particular interest to the metallurgist for detailed discussion and illustration. These included the study of the nature of the polished layer on metals, the orientation of oil molecules during boundary lubrication, and the structure and orientation of crystals deposited by sputtering or electrolysis on other crystal surfaces and of compounds formed in the solid state by chemical action on crystalline solids.

It is interesting to remember that Professor Thomson's father, the late Sir J. J. Thomson, delivered a lecture on the same subject in 1915, just 28 years ago, while the present lecturer was serving in the trenches in France.

Personal Notes

SIR HENRY DALE, President of the Royal Society, was among the distinguished scientists who delivered addresses at the celebration of the 400th anniversary of the death of Copernicus, held at the Royal Institution on Monday.

The Albert Gold Medal of the Royal Society of Arts is being conferred this year on SIR JOHN RUSSELL, Director of Rothamsted Experimental Station. The medal will probably be inscribed "For his services to agriculture in many lands, and notably for his researches in soil and science."

DR. A. F. GREAVES-WALKER, formerly head of the Non-Metals Section, Miscellaneous Minerals Divisions of America's War Production Board, has become deputy chief of the Metals and Minerals Branch of Office of Production and Research, W.P.B. Dr. Greaves-Walker is head of the Department of Ceramic Engineering, North Carolina State College, Raleigh.

DR. ARTHUR B. LAMB, of Harvard University and editor of the Journal of the American Chemical Society, has been awarded the 1943 Nichols Medal of that society. In the address he made when presented with the medal, he said that so far as he knew the journal he edits is the largest periodical publication of research in pure chemistry in the world, having a subscription list of 12,500.

PROFESSOR BROR HOLMBERG, who is resigning his post at the Stockholm Technical High School, is applying for a pension which will enable him to devote himself entirely to organic chemical research. If his application is successful, and it is strongly supported by the Swedish Academy of Science, the laboratory formerly used by Svante Arrhenius at the Nobel Institute, will be placed at his disposal. The Academy will also defray the cost of equipping the laboratory, and will set aside a fund of 125,000 kronor for Professor Holmberg's exclusive use.

The following have passed the examination for the Fellowship of the Royal Institute of Chemistry. In inorganic chemistry: M. HYAMS and (with special reference to iron and steel metallurgy) L. G. W. PALETHORPE; in organic chemistry: G. D. BUCKLEY, P. F. COOKE, D. S. OTTWAY, H. A. WALKER, and (with special reference to diazo compounds) WILLIAM DAVEY; in the chemistry of food and drugs and of water: HERBERT DEDICOAT, HONOR GOODALL; in industrial chemistry (with special reference to water treatment): J. E. EDWARDS; in general analytical chemistry: H. F. FROST, LOUIS HADDOCK. Candidates who passed the examination for the Associateship numbered 27.

LORD RUSHCLIFFE and MR. F. A. LESSER have joined the board of Borax Consolidated, Ltd.

Obituary

COLONEL SIR WILLIAM THOMLINSON, who has died at Seaton Carew, Co. Durham, aged 88, was one of the founders of the Chemical and Insulating Co., Ltd., Darlington, but was latterly more nearly concerned with the iron and steel industry.

New Control Orders

Price-Controlled Goods

The Board of Trade has made the Price-Controlled Goods (Invoices) Order, 1943 (S. R. & O., No. 604) replacing the 1941 order of the same title. This new order comes into force on June 1.

Invoices must now contain the following particulars: (i) the name of, and the address of the principal place of business of the seller; (ii) the name of the buyer and, if another person, of the person to whom the goods are being or will be sent, and the address to which the goods are being or will be sent; (iii) a sufficient description of the goods to which the invoice relates, and in particular the numbers or quantities thereof and also the sizes in cases in which size is a relevant factor in relation to the price charged; (iv) the price paid or payable in respect of each item in the invoice; (v) any discount (whether conditional or not) allowed or to be allowed in respect of any item in the invoice; (vi) any delivery charges payable by the buyer in respect of any items in the invoice; and (vii) the date of the sale of each item in the invoice and the date on which the invoice is furnished.

The provisions regarding furnishing and preserving invoices and requiring a trader to report failure to receive an invoice to the Local Price Regulation Committee remain in the new order as they were in the old one. The order applies only to transactions between traders and does not require invoices to be given to members of the public not buying in the course of a business, but it does not apply where maximum prices are fixed by or under Orders made by the Board of Trade under Defence Regulations.

Polishes

The Limitation of Supplies (Polishes) (No. 2) Order, 1943 (S. R. & O. 1943, No. 697), which comes into force on June 1, extends the provisions of the existing Order (*see* THE CHEMICAL AGE, December 12, 1942, p. 539) for another three months, to August 31, 1943, with the exception that the rate at which polishes may be supplied will be 25 per cent. (instead of 50 per cent.) of supplies made during the standard period (June 1 to November 30, 1939).

General News

From Week to Week

A scientific film society has been formed at Hayes, Middlesex.

Bristol Trades Council recently passed a resolution supporting the demand for a Central Scientific and Technical Planning Board.

The price of cod-liver oil compound in bulk is being raised to 17s. 6d. per gallon as from May 31, after a reconsideration of the costs involved.

The Institute of Physics announces that eleven new Fellows and 31 new Associates were elected last week. At the same time, 18 Subscribers and 26 Students were admitted.

His Majesty The King has been pleased to command that the Institute of Chemistry shall, from May 22, be known as "The Royal Institute of Chemistry of Great Britain and Ireland."

The Parliamentary and Scientific Committee's report on coal utilisation, the subject of comment in our last two issues, is available as a printed booklet on request to the committee's secretary at Courtfield House, Courtfield Gardens, S.W.7.

Production of iodine from seaweed and the use of radioactive iodine isotopes in biological research are two examples of the many interesting details given in the latest "Iodine Facts" published by the Iodine Educational Bureau.

Among subscribers to the recent "Wings for Victory" campaign at Liverpool were the following: Goodlass Wall and Co., Ltd., £7500; H. Russell (Soaps and Disinfectants), Ltd., £1000; Lever Brothers (Port Sunlight), Ltd., £30,000; J. Bibby and Sons, Ltd., £15,000; B. Howard Baker (1933), Ltd., £2500.

A fervent appeal to spare no effort to maintain and foster the Empire's mining industries was made by Lord Geddes, chairman of the Rio Tinto Company, Ltd., at the annual meeting last week. "Our civilisation depends on metals and minerals," he said, "Our power as a nation depends ultimately on metals and minerals, and there are in this island no metals in adequate supply for our requirements."

Mr. Samuel Courtauld, speaking at the Oxford Management Conference, expressed the opinion that the Government should control the location of industry. He considered that dealing with labour was a science, since the workman was the most delicate, incomprehensible and important machine that existed, and needed more care than any other machine. Mr. Courtauld said he believed in the fullest possible co-operation with the trade unions.

Several readers have asked for the original reference of Professor Kuhn's lecture which we mentioned in our Notes and Comments under the heading, German "Penicillin," in our issue of May 8. This lecture, to the Society for Medical and Natural Sciences at Jena, was reported in the *Frankfurter Zeitung* of April 2.

The paper economy exhibition, "Design for Economy: Paper in Battledress," recently shown in London, is now in Manchester, where it will continue until June 5, and it will later make a tour of other large towns. The Waste Paper Recovery Association, who organised the exhibition, have received inquiries from America, Australia and India from concerns who wish to arrange similar exhibitions in those countries.

The Association of Scientific Workers and the Institution of Professional Civil Servants are negotiating with the Ministry of Supply for increases in salary of laboratory assistants. The negotiations are not yet complete, but the Ministry has already agreed that for the duration all laboratory assistants who obtain Inter.B.Sc. will be promoted to the Grade of Assistant III irrespective of whether there are vacancies in the Assistant III Grade or not.

The following goods, packed in containers of 1 lb. weight and upwards, are chargeable with tax at 16⅔ per cent. of the wholesale value: (i) glycerin substitutes which conform strictly to the B.P.C. formulae for such substitutes; (ii) glycerin substitutes which are shown to the satisfaction of the Commissioners of Customs and Excise to be approved glycerin substitutes. Other glycerin substitutes and all glycerin substitutes which are packed in containers of less than 1 lb. weight are chargeable with tax at 33⅓ per cent.

The American Library, which has been operating for several months as a special reference library, has now been formally opened at the American Embassy, 1 Grosvenor Square, London, W.1. Many of the American books and periodicals are of great value to research institutions, and cannot readily be consulted elsewhere. Dr. R. H. Heindel, the director, has stressed the point that the library will be of great help when the time comes to rebuild the libraries and intellectual life of devastated Europe.

Foreign News

Erection of new detinning plants in Canada will bring the total detinning capacity to 400,000 tons, compared with 250,000 in 1942.

Lubricating oil in Belgium is so scarce that it is fetching about £3 5s. a gallon in the black market, according to the Belgian news agency.

Duty and tax free entry of ferro-vanadium and vanadium oxide to Canada is permitted under a new Order in Council, retroactive to January 2, 1943.

Magnitogorsk district of the Urals increased steel output by 25 per cent. and rolled-metal output by 34 per cent. in the second half of 1942.

Shortage of chemical fertilisers is being experienced in the Canary Isles. During the fourth quarter of last year only 2200 tons of nitrate from Chile, and about 2000 sacks of potash from Spain arrived.

The Argentine Minister of Agriculture has been authorised to expropriate 130,000 tons of wheat for fuel, according to Reuter. The Minister is also to ask for tenders for the establishment of a synthetic rubber factory in Argentina.

The wolfram mines of Benvenida and Abundancia, Spain, destroyed during the civil war, are to be put into production again. Daily output is estimated at 80 tons. of crude ore.

Castle Chemical Works, Ltd., was organised recently in Toronto, Canada, and will engage in the manufacture of nickel catalyst for the chemical and hydrogenation industries.

Peru is to have an iron and steel industry with annual production capacity of some 100,000 metric tons of finished iron and steel products. It is estimated that plant construction will take 2 or 3 years.

Lead mining operations are being encouraged in southern Bolivia, particularly in the Sud Chichas province. The Tito Hoyo mine has been re-established after being idle since 1931, and output has increased at La Aviadora, La Salvadora and La Ripida mines.

Damourite, a variety of mica, has been added to the substantial list of non-metallic minerals produced in South Australia. It is now being mined in the hundred of Barossa, county of Adelaide, and is being marketed in the eastern States.

Iron-ore deposits discovered in 1938 in Divrik, Turkey, have produced 500,000 tons of ore in 3½ years. Half of the output has gone to the Karabuk iron and steel works and 200,000 tons of ore has accumulated at the mine-head.

The most delicate test for minute quantities of ethylene is a sprouted pea seed, which is capable of detecting 1 part in 20-40 million parts of air. The method depends upon the fact that a pea seedling in the presence of ethylene does not continue to grow vertically, but bends towards a horizontal position owing to unequal growth due to the ethylene stimulation of the growing tissues. It is described by P. W. Rohrbaugh of the California Fruit Growers Exchange in *Plant Physiology*, 1943, *18*, 1, p. 79.

Among Indian minerals that have received authorisation for exploitation in Kashmir are opal, mica, barytes, bentonite, kaolin, and ochres. The manufacture of plaster of Paris from gypsum has received approval.

The recent meeting of the Industrial Research Institute of America in Philadelphia discussed post-war planning as it affects research laboratories. Speakers brought out the point that, without slackening their war effort, many American industrial concerns were still able to give organised attention to post-war problems and methods.

Thousands of chemical patents formerly owned by enemy nationals, but now under the control of the Alien Property Custodian, were displayed at the recent Detroit meeting of the American Chemical Society. A staff of chemists and patent attorneys were present to answer questions, especially those relating to the recently-announced patent policy of the Custodian. The patents shown were available for licensing under liberal terms.

New American prices for synthetic rubber, 2 to 20 cents. a pound lower than previous levels, were set by the Office of Price Administration in agreement with the Secretary of Commerce and the Rubber Director. In announcing the new prices, it was stated that most of the synthetic rubber produced this year will be required for military products. The new prices are: Buna S, 36 c.; Butyl, 33 c.; Neoprene, 45 c.

Riedel-de Haen G.m.b.H. has been registered at Riga with a capital of 50,000 RM. The company is to act as adviser to the consumers of products of the German chemical interests concerned. Metall und Lurgi Ostland G.m.b.H. is another company formed at Riga with a capital of 20,000 RM. for the sale and construction of technical equipment. The Metallgesellschaft of Frankfort is interested in the new firm.

A joint committee on nitrogen utilisation has recently been organised in America under the chairmanship of R. M. Salter, chief of the U.S. Bureau of Plant Industry, to study the problems to be raised by the very large tonnage of nitrogen that will be available after the war. The total capacity for manufacture of synthetic nitrogen in the United States after the war will be more than twice the country's maximum annual pre-war consumption of nitrogen for all purposes.

Forthcoming Events

The annual general meeting of the **British Ceramic Society** will be held at Stoke-on-Trent, at 6.30 p.m., on **June 1.**

A meeting of the Northern section of the **Institute of the Plastics Industry** has been arranged for **June 5**, at 2 p.m., at the Engineers' Club, Albert Square, Manchester, when a paper will be read by Mr. A. Renfrew, B.Sc., on "Thermoplastics."

Prices of British Chemical Products

MARKET conditions generally are reported as steady, with deliveries against existing contracts covering substantial amounts, and values throughout the market display a strong undertone. A fair volume of new inquiry is reported, although actual bookings are regulated by the supply position which, in several sections of the market, shows little improvement. Among the soda products a continued demand is reported for bicarbonate of soda, Glauber salt and salt cake, with inquiries for acetate of soda and nitrate of soda well maintained. The limited quantities of bichromate of soda continue to be distributed on a quota basis. The majority of the potash products are available in restricted quantities, with nominal prices ruling for yellow prussiate of potash. The lead oxides are receiving a steady inquiry and zinc oxide is a good market. No change is reported from the acid section, and white powdered arsenic and formaldehyde continue to enjoy a good inquiry. Conditions in the coal-tar products market remain unaltered with naphthalene and the xylols in steady demand, while a good trade is passing in carbolic acid and cresylic acid.

MANCHESTER.—Fairly substantial quantities of a wide range of chemicals are going into consumption in the Lancashire cotton bleaching, dyeing, and finishing trades, while a steady outlet among West Riding users has also been reported on the Manchester market during the past week. Current requirements from these sections, as well as from the other leading consumers, are mainly against contracts, which are being steadily renewed as the necessity arises. Fresh business during the past week has been on a moderate scale. In all sections of the market quotations maintain a strong undertone, though actual changes have been few and small.

GLASGOW.—Business in the Scottish heavy chemical trade has continued steady during the week for the home trade with prices well maintained. Export inquiries are unlimited.

Price Changes

Rises: Aluminium sulphate; barium chloride; linseed oil; rapeseed oil; zinc oxide; also certain grades of pyridine.

General Chemicals

Acetic Acid.—Maximum prices per ton: 80% technical, 1 ton £39 10s.; 10 cwt./ 1 ton, £40 10s., 4/10 cwt., £41 10s.; 80% pure, 1 ton, £41 10s.: 10 cwt./1 ton, £42 10s.; 4/10 cwt., £43 10s.; commercial glacial, 1 ton, £49; 10 cwt./1 ton, £50; 4/10 cwt., £51; delivered buyers' premises in returnable barrels, £4 10s. per ton extra if packed and delivered in glass.

Acetone.—Maximum prices per ton, 50 tons and over, £65; 10/50 tons, £65 10s.; 5/10 tons, £66; 1/5 tons, £66 10s.; single drums, £67 10s.; delivered buyers' premises in returnable drums or other containers having a capacity of not less than 45 gallons each. For delivery in non-returnable containers of 40/50 gallons, the maximum prices are £3 per ton higher. Deliveries of less than 10 gallons free from price control.

Alum.—Loose lump, £14 10s. per ton, f.o.b.

Aluminium Sulphate.—£11 10s. to £11 15s. per ton d/d.

Ammonia, Anhydrous.—1s. 9d. to 2s. 3d. per lb.

Ammonium Carbonate.—£38 to £39 per ton d/d in 5 cwt. casks.

Ammonium Chloride.—Grey galvanising, £22 10s. per ton, in casks, ex wharf. Fine white 98%, £19 10s. per ton. See also Salammoniac.

Antimony Oxide.—£111 to £117 per ton.

Arsenic.—For 1-ton lots, £42 to £45 per ton, according to quality, ex store. Intermediate prices for intervening quantities.

Barium Carbonate.—MANCHESTER: precip. (4-ton lots), £16 per ton d/d.

Barium Chloride.—98/100%, prime white crystals, £17 10s. to £19 10s. per ton, bag packing, ex works.

Bleaching Powder.—Spot, 35/37%, £11 to £11 10s. per ton in casks, special terms for contract.

Borax, Commercial.—Granulated, £31 10s.; crystals, £32 10s.; powdered, £33; extra fine powder, £34; B.P. crystals £40 10s.; powdered, £41; extra fine, £42 per ton for ton-lots, in free 1-cwt. bags, carriage paid in Great Britain. Borax Glass, lump, £83; powder, £84 per ton in tin-lined cases for home trade only, packages free, carriage paid.

Boric Acid.—Commercial, granulated, £52 15s.; crystals, £53 15s.; powdered, £54 15s.; extra fine powder, £56 15s.; B.P. crystals, £61 15s.; powdered, £62 15s.; extra fine powdered, £64 15s. per ton for ton lots in free 1-cwt. bags, carriage paid in Great Britain.

Calcium Bisulphite.—£6 10s. to £7 10s. per ton f.o.r. London.

Calcium Chloride.—70/72% solid, £5 15s. per ton, ex store.

Charcoal, Lump.—£10 10s. to £14 per ton, ex wharf. Granulated, supplies scarce.

Chlorine, Liquid.—£23 per ton, d/d in 16/17 cwt. drums (3-drum lots).

Chrometan.—Crystals, 5½d. per lb.

Chromic Acid.—1s. 5d. per lb., less 2½%, d/d U.K.

Citric Acid.—Controlled prices per lb., d/d buyers' premises. For 5 cwt. or over, anhydrous, 1s. 6¾d., other, 1s. 5d.; 1 to 5 cwt., anhydrous, 1s. 9d., other, 1s. 7d. Higher prices for smaller quantities.

Copper Oxide.—Black, £95 per ton.

Copper Sulphate.—£31 5s. per ton, f.o.b., less 2 per cent. in 2 cwt. bags.

Cream of Tartar.—100%, £18 12s. per cwt., less 2½%, d/d in sellers' returnable casks.

Formaldehyde.—£24 10s. to £26 per ton in casks, according to quantity, d/d. MANCHESTER: 40%, £24 10s. to £26 10s. per ton in casks, according to quantity, d/d.

Formic Acid.—85%, £47 per ton for ton lots, carriage paid; smaller parcels quoted up to 50s. per cwt., ex store.

Glycerine.—Chemically pure, double distilled 1260 s.g., in tins, £4 to £5 per cwt., according to quantity; in drums, £3 14s. 6d. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hexamine.—Technical grade for commercial purposes, about 1s. 4d. per lb.; free-running crystals are quoted at 2s. 1d. to 2s. 3d. per lb.; carriage paid for bulk lots.

Hydrochloric Acid.—Spot, 6s. 5½d. to 8s. 11d. per carboy d/d, according to purity, strength and locality.

Hydrofluoric Acid.—59/60%, about 1s. to 1s. 2d. per lb.

Iodine.—Resublimed B.P., 10s. 4d. to 14s. 6d. per lb., according to quantity.

Lactic Acid.—Pale tech., 43½ per cent. by weight, £49 per ton; dark tech., 43½ per cent. by weight, £42 per ton ex works; barrels returnable carriage paid.

Lead Acetate.—White, 50s. 6d. to 52s. 6d. per cwt. MANCHESTER: £51 to £54 per ton.

Lead Nitrate.—About £47 per ton d/d in casks.

Lead, Red.—English, 5/10 cwt., £44 10s. per ton; 10 cwt. to 1 ton, £44 5s.; 1/2 tons, £44; 2/5 tons, £43 10s.; 5/20 tons, £43; 20/100 tons, £42 10s.; over 100 tons, £42 per ton, less 2½%, carriage paid, non-setting red lead, 10s. per ton dearer in each case.

Lead, White.—Dry English, less than 5 tons, £57; 5/15 tons, £53; 15/25 tons, £52 10s.; 25/50 tons, £52; 50/200 tons, £51 10s. per ton; less 5%, carriage paid; Continental material, £1 per ton cheaper Ground in oil, English, 1/5 cwt., £68 10s.; 5/10 cwt., £67 10s.; 10 cwt. to 1 ton, £67; 1/2 tons, £65 10s.; 2/5 tons, £64 10s.; 5/10 tons, £62 10s.; 10/15 tons, £61 10s.; 15/25 tons, £60 10s.; 50/100 tons, £60 per ton, less 5% carriage paid.

Litharge.—1 to 2 tons, £44 10s. per ton.

Lithium Carbonate.—7s. 9d. per lb. net.

Magnesite.—Calcined, in bags, ex works, £18 15s. to £22 15s. per ton.

Magnesium Chloride.—Solid (ex wharf), £16 to £18 per ton. MANCHESTER: £14 to £16 per ton.

Magnesium Sulphate.—Commercial, £12 to £14 per ton, according to quality, ex works.

Mercury Products.—Controlled price for 1 cwt. quantities: Bichloride powder, 15s. 8d.; bichloride lump, 16s. 8d.; ammon. chloride powder, 17s. 10d., ammon. chloride lump, 17s. 8d.; mercurous chloride, 18s. 7d.; mercury oxide, red cryst., 20s. 9d.; red levig., 20s. 3d.; red tech., 19s. 11d.; yellow levig., 20s. 2d.; yellow tech., 19s. 7d.; sulphide, red, 17s. 9d.

Methylated Spirit.—Industrial 66° O.P. 100 gals., 2s. 4d. per gal.; pyridinised 64° O.P. 100 gals., 2s. 5d. per gal.

Nitric Acid.—£24 to £26 per ton, ex works.

Oxalic Acid.—£60 to £65 per ton for ton lots, carriage paid, in 5-cwt. casks; smaller parcels would be dearer; deliveries slow.

Paraffin Wax.—Nominal.

Potash, Caustic.—Basic price for 50-100 ton lots. Solid, 88/92%, commercial grade, £53 7s. 6d. per ton, c.i.f. U.K. port, duty paid. Broken, £5 extra; flake, £7 10s. extra; powder, £10 extra per ton. Ex store, £3 10s. supplement. Liquid, d/d, £34 in lots of 1 ton.

Potassium Bichromate.—Crystals and granular, 7¾d. per lb.; ground, 8¼d. per lb., for not less than 6 cwt.; 1-cwt. lots, ½d. per lb. extra.

Potassium Carbonate.—Basic prices for 50 to 100 ton lots; calcined, 98/100%, £52 10s. per ton, c.i.f. U.K. port. Ex warehouse, £55 5s. per ton.

Potassium Chlorate.—Imported powder and crystals, nominal.

Potassium Iodide.—B.P., 8s. 8d. to 12s. per lb., according to quantity.

Potassium Nitrate.—Small granular crystals, 64s. per cwt. ex store, according to quantity.

Potassium Permanganate.—B.P., 1s. 10d. per lb. for 1 cwt. lots; for 3 cwt. and upwards, 1s. 9½d. per lb.; technical, £7 18s. 6d. to £8 10s. 6d. per cwt., according to quantity d/d.

Potassium Prussiate.—Yellow, 5 cwt. to 7 cwt., casks, 1s. 6d. per lb., d/d; supplies scarce.

Salammoniac.—First lump, spot, £48 per ton; dog-tooth crystals, £50 per ton; medium, £48 10s. per ton; fine white crystals, £19 10s. per ton, in casks, ex store.

Soda, Caustic. — Solid 76/77%; spot, £16 7s. 6d. per ton d/d station.

Sodium Acetate.—£41 per ton, ex wharf.

Sodium Bicarbonate.—Refined, spot, £11 per ton, in bags.

Sodium Bichromate.—Crystals, cake and powder, 6¼d. per lb.; anhydrous, 6½d. per lb., net, d/d U.K.

Sodium Bisulphite Powder.—60/62%, £19 10s. per ton d/d in 2-ton lots for home trade.

Sodium Carbonate Monohydrate.—£21 per ton d/d in minimum ton lots in 2 cwt. free bags.

Sodium Chlorate.—£36 to £45 per ton, d/d, according to quantity.

Sodium Hyposulphite.—Pea crystals, £20 per ton for 2-ton lots; commercial, £15 per ton; photographic, £22 per ton.

Sodium Iodide.—B.P., for not less than 28 lb., 9s. 11d. per lb., for not less than 7 lb., 13s. 1d. per lb.

Sodium Metasilicate.—£16 per ton, d/d U.K. in 1-ton lots.

Sodium Nitrite.—£20 to £23 10s. per ton for ton lots.

Sodium Percarbonate.—21½% available oxygen, £7 per cwt.

Sodium Phosphate.—Di-sodium, £20 to £25 per ton d/d for ton lots. Tri-sodium, £26 to £30 per ton d/d for ton lots.

Sodium Prussiate.—8¾d. to 9½d. per lb. ex store.

Sodium Silicate.—£6 to £11 per ton.

Sodium Sulphate (Glauber Salts).—£4 10s. ton d/d.

Sodium Sulphate (Salt Cake).—Unground. Spot £4 11s. per ton d/d station in bulk. MANCHESTER: £4 15s. per ton d/d station.

Sodium Sulphide. — Solid, 60/62%, spot, £17 15s. per ton, d/d, in drums; crystals, 30/32%, £12 7s. 6d. per ton, d/d, in casks.

Sodium Sulphite.—Anhydrous, £29 10s. per ton; pea crystals, spot. £20 10s. per ton d/d station in kegs; commercial, £12 to £14 per ton d/d station in bags.

Sulphur.—Per ton, for quantities of not less than 4 tons; ground, but not sieved, £15 10s.; ground and sieved, £17 15s. Controlled prices.

Sulphuric Acid.—168° Tw., £6 10s. to £7 10s. per ton; 140° Tw., arsenic-free, £4 11s. per ton; 140° Tw., arsenious, £4 3s. 6d. per ton. Quotations naked at sellers' works.

Tartaric Acid.—4s. 4d. per lb., less 5%, carriage paid for lots of 5 cwt. and upwards. MANCHESTER: 4s. 4d. per lb.

Tin Oxide.—Snow white, 305s.-315s. per cwt.

Zinc Oxide.—Maximum prices per ton for 2-ton lots, d/d; white seal, £34; green seal, £33; red seal, £31 10s.

Zinc Sulphate.—Tech., £20-£21 per ton, carriage paid, casks free.

Rubber Chemicals

Antimony Sulphide.—Golden, 1s. 2d. to 2s. 1½d. per lb. Crimson, 2s. 2d. to 2s. 6d. per lb.

Arsenic Sulphide.—Yellow, 1s. 9d. per lb.

Barytes.—Best white bleached, £8 3s. 6d. per ton.

Cadmium Sulphide.—6s. to 6s. 6d. per lb.

Carbon Black.—6d. to 8d. per lb., according to packing.

Carbon Bisulphide.—£34 per ton, according to quality, in free returnable drums.

Carbon Tetrachloride.—£46 to £49 per ton.

Chromium Oxide.—Green, 2s. per lb.

India-rubber Substitutes.—White, 6 3/16d. to 10¼d. per lb.; dark, 6 3/16d. to 6 15/16d. per lb.

Lithopone.—30%, £25 per ton; 60%, £31 to £32 per ton. Imported material would be dearer.

Mineral Black.—£7 10s. to £10 per ton.

Mineral Rubber, "Rupron."—£20 per ton.

Sulphur Chloride.—7d. per lb.

Vegetable Lamp Black.—£49 per ton.

Vermilion.—Pale or deep, 15s. 6d. per lb. for 7-lb. lots.
Plus 5% War Charge.

Nitrogen Fertilisers

Ammonium Phosphate Fertilisers.—Type B, See Concentrated Fertilisers.

Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station, August, £9 10s.; increased charge of 1s. 6d. per month up to March, 1943.

Calcium Cyanamide.—Nominal; supplies very scanty.

Concentrated Fertilisers.—Per ton in 6-ton lots d/d farmer's nearest station, in August: I.C.I. Type, "Special III," £14 9s. 6d.; Type "B," £14 1s. 3d.; Type "C," £17 19s. Increased charge of 1s. 6d. per month up to March, 1943.

"Nitro Chalk."—£9 14s. per ton in 6-ton lots, d/d farmer's nearest station.

Sodium Nitrate.—Chilean super-refined for 6-ton lots d/d nearest station, £15 5s. per ton; granulated, over 98%, £14 10s. per ton. Surcharges for smaller quantities unless collected at warehouse or depots.

Coal Tar Products

Benzol.—Crude, 60's, 1s. 11d.; pure, 2s. 6d., per gal., ex works.

Carbolic Acid.—Crystals, 9½d. to 11½d. per lb. Crude, 60's, 4s. 3d. to 4s. 6d., according to specification. MANCHESTER: Crystals, 9½d. to 11½d. per lb., d/d; crude, 4s. to 4s. 6d., naked, at works.

Creosote.—Home trade, 6½d. per gal., f.o.r., maker's works; exports, 6d. to 6½d. per gal., according to grade. MANCHESTER: 6½d. to 9d. per gal.

Cresylic Acid.—Pale, 97%, 3s. 6d. per gal.; 99%, 4s. 2d.; 99.5/100%, 4s. 4d. MANCHESTER: Pale, 99/100%, 4s. 6d. per gal.

Naphtha.—Solvent, 90/160°, 2s. 8d. per gal. for 1000-gal. lots; heavy, 90/190°, 2s. 2d. per gal. for 1000-gal. lots, d/d. Drums extra; higher prices for smaller lots. Controlled prices.

Naphthalene.—Crude, in 4-ton lots, in sellers' bags, £5 9s. to £8 9s. per ton, according to m.p.; hot-pressed, £10 5s. per ton; purified crystals, £19 to £35 per ton. Controlled prices.

Pitch.—Medium, soft, 45s. to 55s. per ton, f.o.b. MANCHESTER: 46s. per ton, at works.

Pyridine.—90/140°, 18s. to 18s. 6d. per gal.; 90/160°, 14s. MANCHESTER: 14s. to 18s. 6d. per gal.

Toluol.—Pure, 2s. 5d. nominal; 90's, 1s. 10d. per gal. MANCHESTER: Pure, 2s. 5d. per gal. naked.

Xylol.—For 1000-gal. lots, 3s. 1½d. to 3s. 4d. per gal., according to grade, d/d. Drums extra; higher prices for smaller lots. Controlled prices.

Wood Distillation Products

Calcium Acetate.—Brown, £21 per ton; grey, £24. MANCHESTER: Grey, £24 to £25 per ton.

Methyl Acetone.—40/50%, £56 per ton.

Wood Creosote.—Unrefined, about 2s. per gal., according to boiling range.

Wood Naphtha, Miscible.—4s. 6d. to 5s. 6d. per gal.; solvent, 5s. 6d. per gal.

Wood Tar.—£5 per ton.

Intermediates and Dyes (Prices Nominal)

m-**Cresol** 98/100%.—Nominal.

o-**Cresol** 30/31° C.—Nominal.

p-**Cresol** 34/35° C.—Nominal.

Dichloraniline.—2s. 8½d. per lb.

Dinitrobenzene.—8½d. per lb.

Dinitrotoluene.—48/50° C., 9½d. per lb; 66/68° C., 1s.

p-**Nitraniline.**—2s. 5d. per lb.

Nitrobenzene.—Spot, 5½d. per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyer's works.

Nitronaphthalene.—1s. 2d. per lb.; P.G., 1s. 0½d. per lb.

o-**Toluidine.**—1s. per lb., in 8/10 cwt. drums, drums extra.

p **Toluidine.**—2s. 2d. per lb., in casks.

m-**Xylidine Acetate.**—4s. 5d. per lb., 100%.

Latest Oil Prices

LONDON. — May 26. — For the period ending May 29, per ton, net, naked, ex-mill, works or refinery, and subject to additional charges according to package and location of supplies: LINSEED OIL, crude, £50. RAPESEED OIL, crude, £58. COTTONSEED OIL, crude, £39 12s. 6d.; washed, £42 15s.; refined edible, £48; refined, deodorised, £49. COCONUT OIL, crude, £36 12s. 6d.; refined deodorised, £40. PALM KERNEL OIL, crude, £36; refined deodorised, £40; refined hardened deodorised, £44. PALM OIL, refined deodorised, £46; refined hardened deodorised, £49. GROUNDNUT OIL, crude, £44; neutralised and bleached, £48; refined hardened deodorised, £53 to £54. WHALE OIL, crude hardened, 42 deg., £39; refined hardened, 42 deg., £42. ACID OILS—Groundnut, £27 10s.; soya, £25 10s.; coconut and palm-kernel, £31. ROSIN, 26s. 6d to 33s. per cwt., ex wharf, according to grade. TURPENTINE, American, 87s. per cwt. in drums or barrels, as imported (controlled price).

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

BRITISH ALUMINIUM CO., LTD, Shrewsbury. (M., 29/5/43.) May 4, disposition by Jno. Dunsmuir with consent of the company granted in implement of a trust deed dated September 12, 1934; charged on Woodburn, 1 Neilson Street, Falkirk. *£3,312,318. April 13, 1943.

M. E. D., LTD., Wolverhampton, metal platers. (M., 29/5/43.) May 10, £200 debentures, to T. G. Williams, Wolverhampton; general charge.

DE LA RUE PLASTICS, LTD., London, E. (M., 29/5/43.) April 15, charge, to Industrial & General Trust, Ltd., to secure (pursuant to a guarantee) £260,000 1st debenture stock of Thomas De La Rue & Co.

Notice of Intended Dividend

BEYER, Robert, 22 Farm Street, Mayfair, London, research chemist and inventor. Last day for receiving proofs, May 26, 1943. Trustee, M. Macleod, 4 Bucklersbury, London, E.C.4.

Company News

The British Drug Houses, Ltd., announce a dividend for 1942 of 2 per cent. (same).

A dividend for 1942 of 6 per cent. (same), plus a bonus of 1 per cent., is announced by **Goodlass Wall and Lead Industries, Ltd.**

Chemical and Allied Stocks and Shares

ALTHOUGH sentiment in the stock and share markets again reflected the prevailing disposition to await war developments, security values showed a better tendency under the lead of British Funds. On further consideration of the financial results and balance-sheet position, Imperial Chemical were maintained at 38s. 9d. The yield is small but exceeds that on numerous other leading industrial securities, and last year's 8 per cent. dividend was on the conservative side, as earnings on the ordinary stock units were fully 10¾ per cent. Goodlass Wall 10s. ordinary showed further improvement to 14s. 9d. aided by the raising of the distribution by 1 per cent. to 7 per cent. At 34s. 6d. Borax Consolidated deferred were maintained in price, but elsewhere, following the dividend statement, Dunlop Rubber have moved down to 34s. 6d. which compares with 35s. 3d. a week ago. Imperial Smelting eased to 14s. 3d., and following a small decline, British Aluminium rallied to 50s. British Oxygen were 76s. 3d. compared with 76s. 6d. a week ago. There was a tendency for General Refractories to improve, but at 15s. 6d. the price was little changed on balance. Whereas Lever & Unilever were again slightly lower at 34s. 6d., Lever N.V. showed a further small improvement to 31s. 9d. Amalgamated Metal shares held their recent improvement to 17s. 9d. On the other hand, awaiting the dividend announcement, Allied Ironfounders at 48s. 7½d. have not held all their recent advance. Various other iron and steel issues also lost part of recent gains. Stewarts & Lloyds were 51s. 6d., compared with 52s. 3d. a week ago, Tube Investments 93s. 3d. compared with 94s., Guest Keen 33s. 9d. compared with 34s. 3d., and Dorman Long 27s. 6d. compared with 28s. 3d.

The prevailing view that the results, due in a few weeks, are likely to show maintenance of the dividend at 16½ per cent. were reflected by firmness in the units of the Distillers Co. at 85s. 9d. At 28s 9d. British Plaster Board 5s. shares were steady; the dividend announcement is also due shortly in this case. British Glues & Chemicals 4s. shares remained at 7s. 6d. Pending the full results for the past year's working, B. Laporte continued held firmly and were again 78s. Dealing up to 22s. 9d. have been recorded in Monsanto Chemicals 5½ per cent. preference. Morgan Crucible first and second preference shares continued firmly held, expectations being that the forthcoming results will show that their dividend requirements remain covered with a substantial margin. On the other hand, Barry & Staines eased to 41s. At 39s. 1½d. British Match fully maintained their recent improvement, and Nairn & Greenwich remained at 67s. 6d. Wall Paper Manufacturers deferred units rallied to 36s. 9d.

Among shares of companies connected with plastics, British Industrial Plastics 2s. ordinary again changed hands around 5s. 10½d. Erinoid were 11s. 6d., and Lacrinoid Products 4s. 4½d. Awaiting the dividend statement, Thomas De La Rue changed hands up to £5 3/16. In other directions, Cellon 5s. shares, which remained under the influence of the dividend, have transferred around 22s. 6d. Greeff-Chemicals 5s. ordinary were 7s. There was again a fair amount of activity in British Emulsifiers 2s. shares, which were 3s. 4½d. Fisons ordinary marked 48s. at one time, and W. J. Bush continued to be quoted at 50s.

"middle." Leeds Fireclay issues remained quite active; the preference were 16s. and the ordinary shares around 10s. Triplex Glass 10s. shares were well maintained at 32s. and firmly held on general recognition of the strong financial position. British Indestructo Glass shares were more active around 4s. 9d. awaiting the annual results. In other directions Boots Drug were little changed on balance at 41s., while Sangers were 20s. 10½d., and Timothy Whites 28s. 7½d. British Drug Houses were quoted at 21s. 6d. following declaration of the dividend. There was a firmer trend in oil shares; Burmah Oil have been in better demand at the time of writing.

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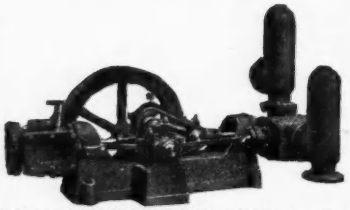

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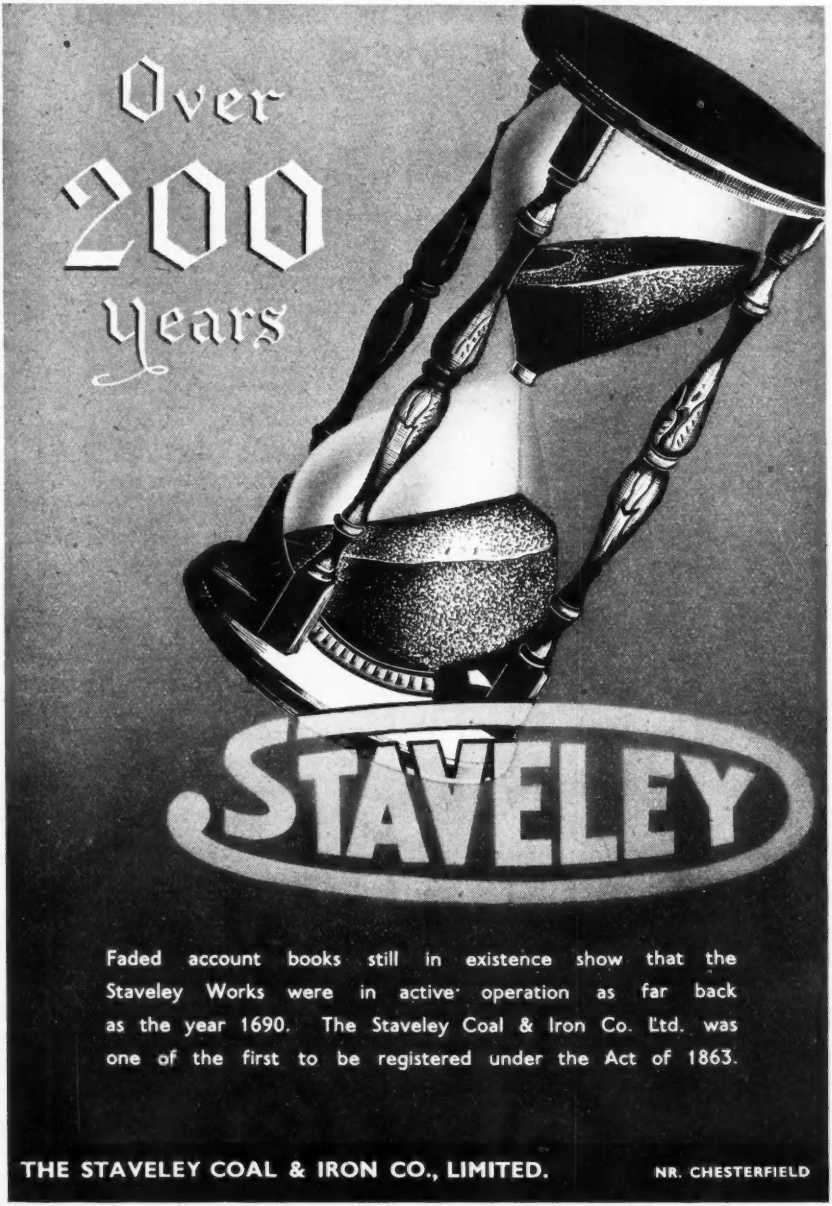

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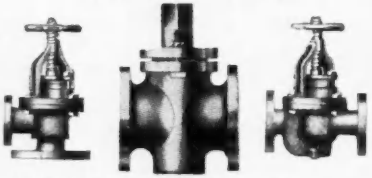
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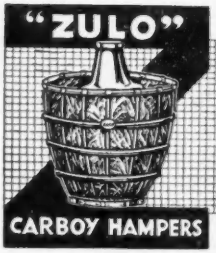

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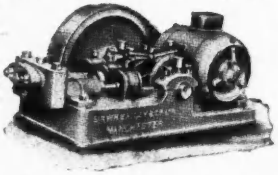

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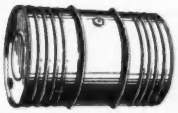

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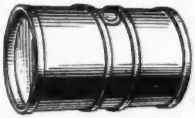

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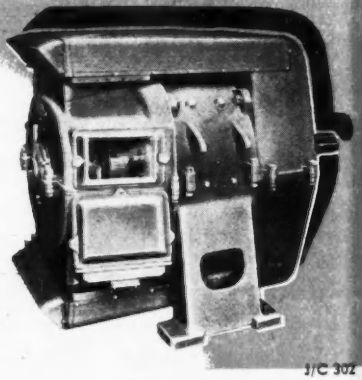

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